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"SEVEN DAYS IN MAY"

METEOROLOGICAL FACTORS ASSOCIATED WITH THE ALBERTA FOREST FIRES OF MAY 18-25, 1968

by

Jock McLean & Blane Coulcher

ALBERTA FOREST SERVICE
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S E V E N D A Y S I N M A Y

METEOROLOGICAL FACTORS ASSOCIATED WITH

THE ALBERTA FOREST FIRES

OF MAY 18-25, 1968

A C K N O W L E D G M E N T S

We would like to acknowledge the following agencies and people for their generous assistance in providing data and advice necessary to put this report together. Without their help this report would not have been possible.

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A U T H O R S

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November 1968

C O N T E N T S

		Page
I	Introduction	1
II	Long Term Meteorological Factors	2
	(a) Drought Factor	
	(b) Mild Winter Factor	
	(c) Dry Grass Factor	
III	Risk Factor	4
IV	Short Term Weather Factors	5
V	Daily Weather - May 17 to May 25	6
	Summary	21
	Appendix	23

I. INTRODUCTION

Forest fires of uncontrolled violence devastated vast areas of Alberta's forests during the third week of May 1968. The fires established two new records - the greatest number of outbreaks ever recorded so early in the season, and the largest acreage ever incinerated so early in the season.

The period was characterized by low humidities, above normal temperatures, and strong persistent southerly winds. On one day, May 24th, in the Swan Hills area, the forward spread of a fire through mature timber was over 40 miles. Fire intensity was extreme with spruce trees, 24 inches in diameter, snapped off by the force of fire wind turbulence at peak periods.

The fires burned over 900,000 acres in total, with timber loss estimated to exceed two billion board feet. One sawmill was destroyed and several timber quotas were severely disrupted. Suppression costs ran over five million dollars. Fortunately, no lives were lost and property loss was not high, although several settled areas had to be evacuated during the peak of the fires.

The serious rash of fire outbreaks was the result of an accumulation and simultaneous combination of five main factors. First, the areas that bore the brunt of the spring fires had been subjected to a severe drought during the previous summer. This was followed by an unusually mild, dry winter and in the spring further warm weather had evaporated most of the remaining snow cover thus exposing vast areas of dry, cured grass. During the middle of May, a large number of brush fires were ignited upwind from the forested areas. This, coupled with the development of a blocking weather pattern aloft and strong, dry, southerly winds at the surface, produced the necessary conditions for a critical outbreak of forest fires.

II. LONG TERM METEOROLOGICAL FACTORS

(a) Drought Factor

As mentioned in the introduction, the areas that carried these spring fires in Alberta had been subjected to a very severe drought during the previous summer. (See Fig. 1 and soil moisture index graphs in Appendix.) Snowfall over the same area was also generally below normal (Fig. 2). In addition, much of the winter's snowfall itself had a lower than normal moisture content.

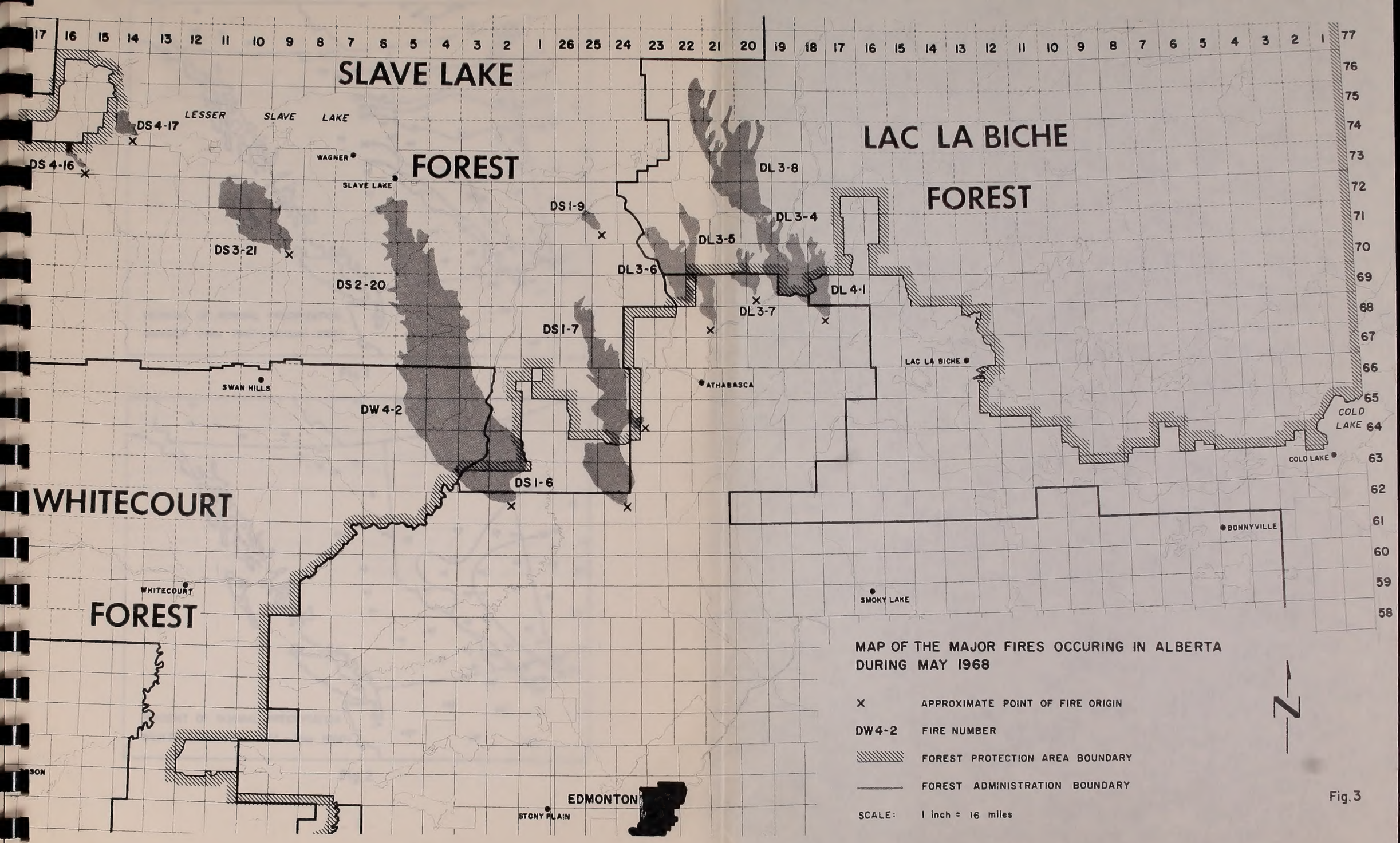
(b) Mild Winter Factor

Even though snowfall was very light during the winter, it was hoped that the melting of this snow cover in the spring might have provided a moisture source which would help replenish the moisture loss in the surface fuels. This did not occur however, because frequent chinooks and subsequent mild temperatures during the winter continually reduced the depth of snow cover. With the advent of spring, a final mild spell evaporated most of the remaining snow cover so that by the end of April almost all the forest areas were free of snow and drying commenced in the exposed surface fuels. Normal transpiration was not occurring in coniferous stands as frost remained in the ground and much of the foliage was becoming very dry through dehydration. Another important feature about the spring of 1968 was the lack of heavy spring rains throughout the forest regions.

The following table compares 1968 monthly temperature means (calculated from daily maximum and minimum temperatures) with normal monthly mean temperatures.

Month	Mean Temp.	Normal	Deviation
January 1968	4.3	6.6	- 2.3
February 1968	19.5	11.2	+ 8.3
March 1968	34.0	22.1	+ 11.9
April 1968	40.0	39.5	+ 0.5
May 1968	52.1	52.1	0.0

Note particularly the abnormal temperatures for February and March 1968.

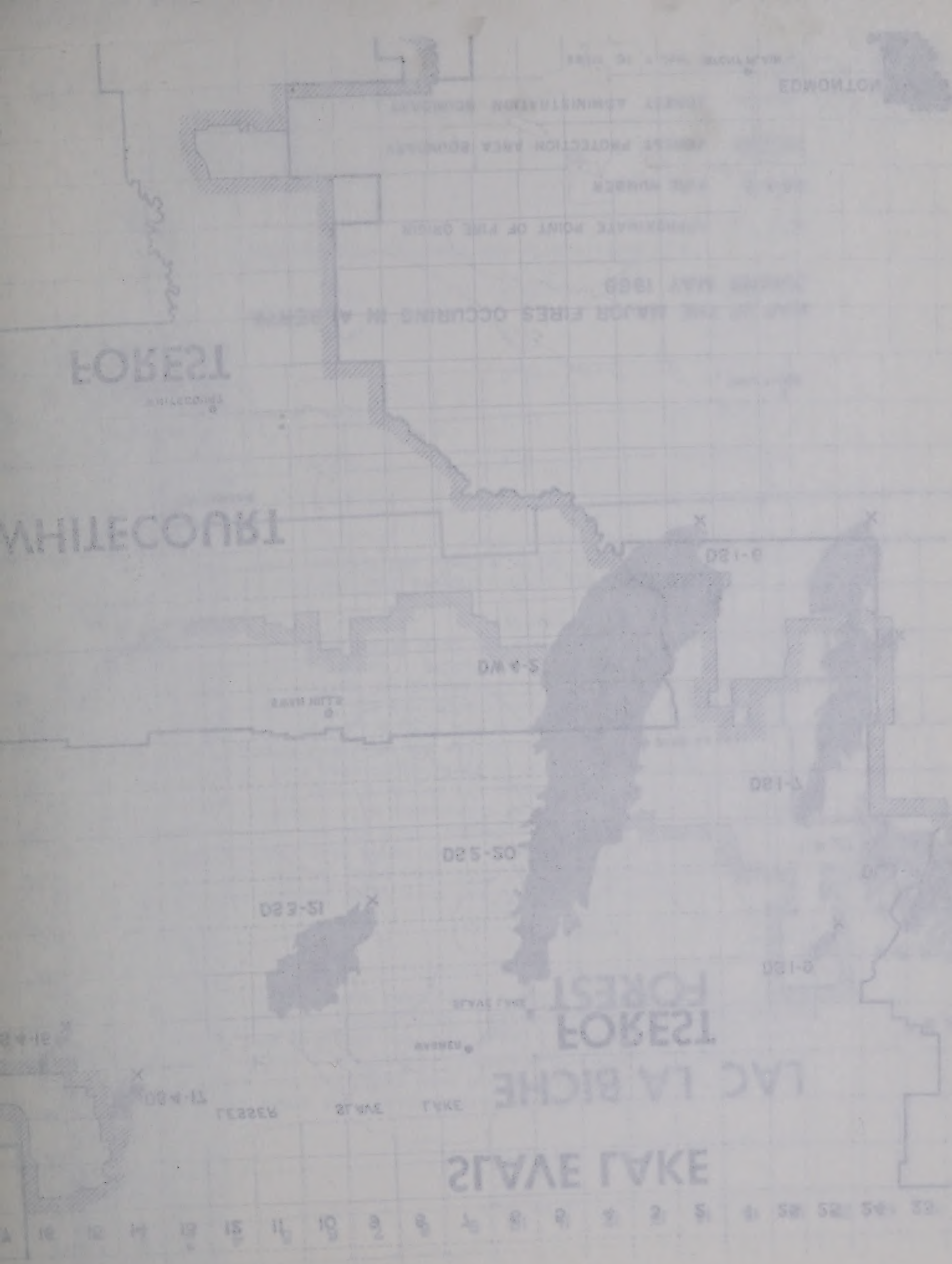


MAP OF THE MAJOR FIRES OCCURING IN ALBERTA DURING MAY 1968

×	APPROXIMATE POINT OF FIRE ORIGIN
DW4-2	FIRE NUMBER
▨	FOREST PROTECTION AREA BOUNDARY
——	FOREST ADMINISTRATION BOUNDARY
SCALE:	1 inch = 16 miles

N

Fig. 3


FOREST
WHITECOURT
SLAVE LAKE

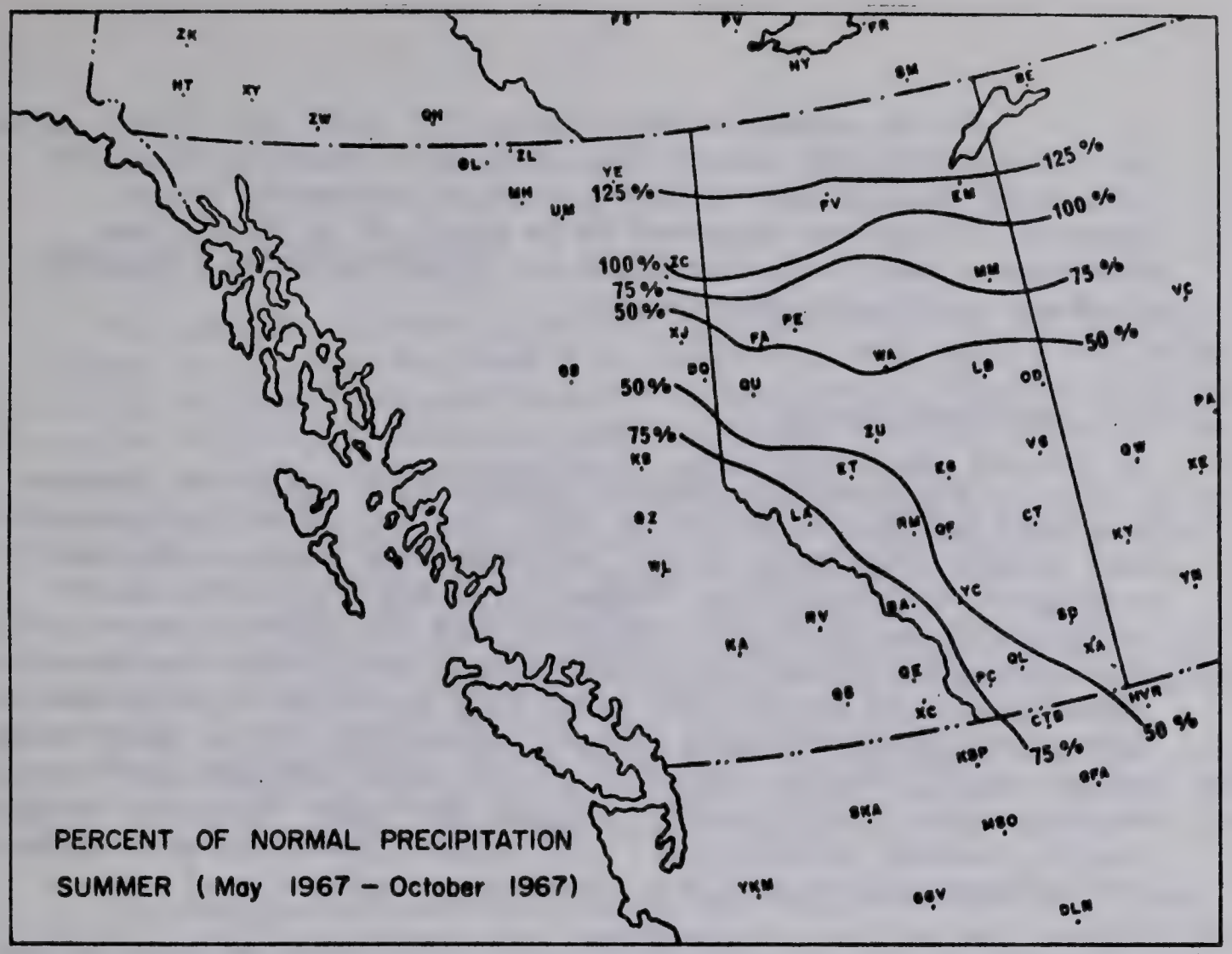

125 %
100 %
75 %
50 %
PERCENT OF NORMAL PRECIPITATION
SUMMER (May 1967 – October 1967)

Fig.1

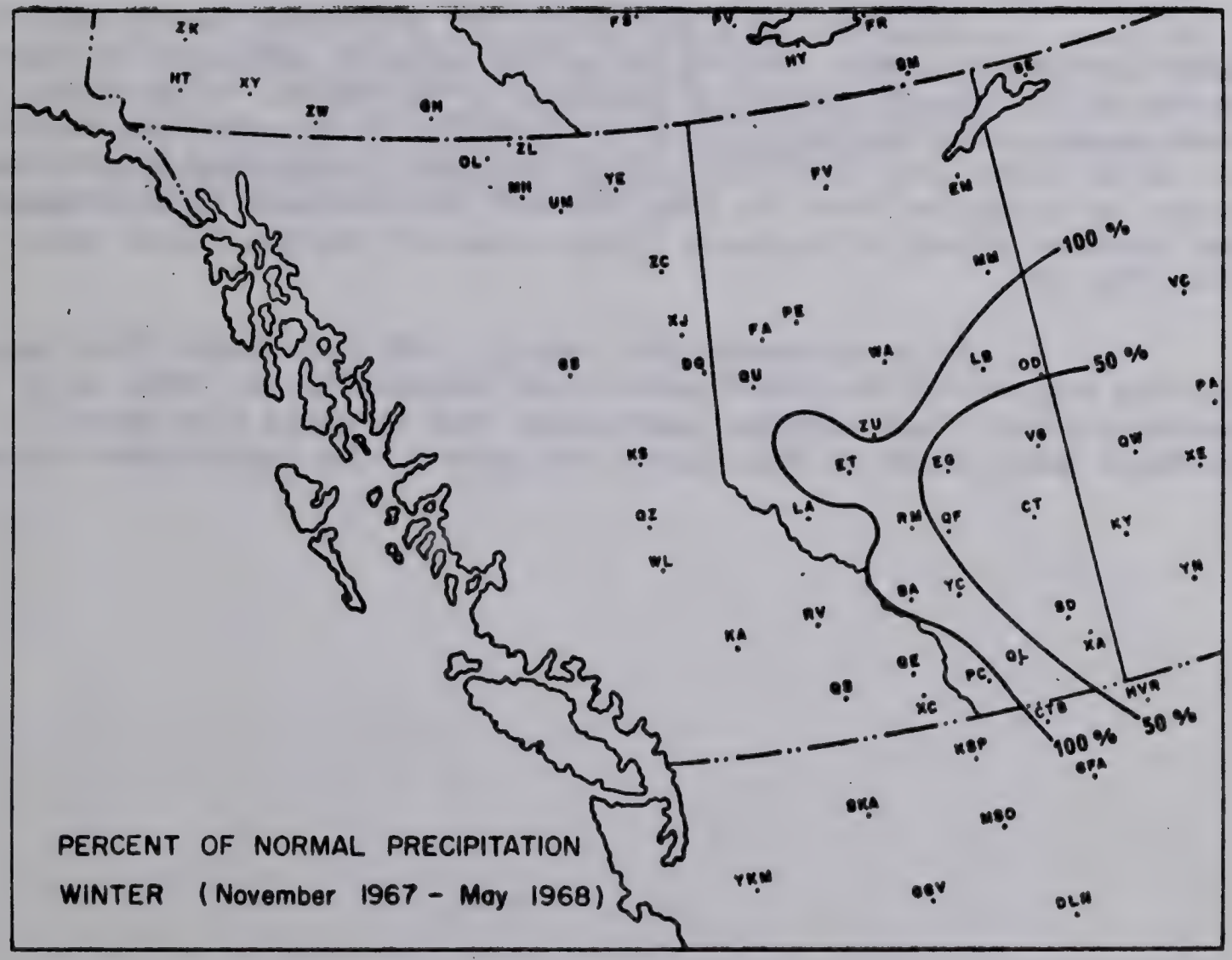

100 %
50 %
75 %
PERCENT OF NORMAL PRECIPITATION
WINTER (November 1967 – May 1968)

Fig. 2

By the middle of May, warm, dry winds had further dried the region, with the result that both light surface fuels and coniferous foliage had reached a highly inflammable state. Hardwood foliage was reported to be about 40 to 50 per cent developed. When fully developed and occurring in pure stands, it often serves as a fire break.

(c) Dry Grass Factor

Dry grass is always a serious fire hazard in Alberta bushlands but in the spring of 1968, the dry grass was exposed much earlier than most years. Although mild temperatures had evaporated the snow cover, temperatures had not yet warmed sufficiently to start new vegetation and all the previous year's grass and other herbaceous growth became cured, dry, and very inflammable. It was the dry grass that initially carried the fire spread from the brush burning operations. These grass fires spread quickly and ran ahead to ignite brush and isolated trees, which in turn caused sparks to ignite new areas downwind, which finally reached timber areas. All these grass fires were under the influence of strong, dry, southerly winds.

III. RISK FACTOR

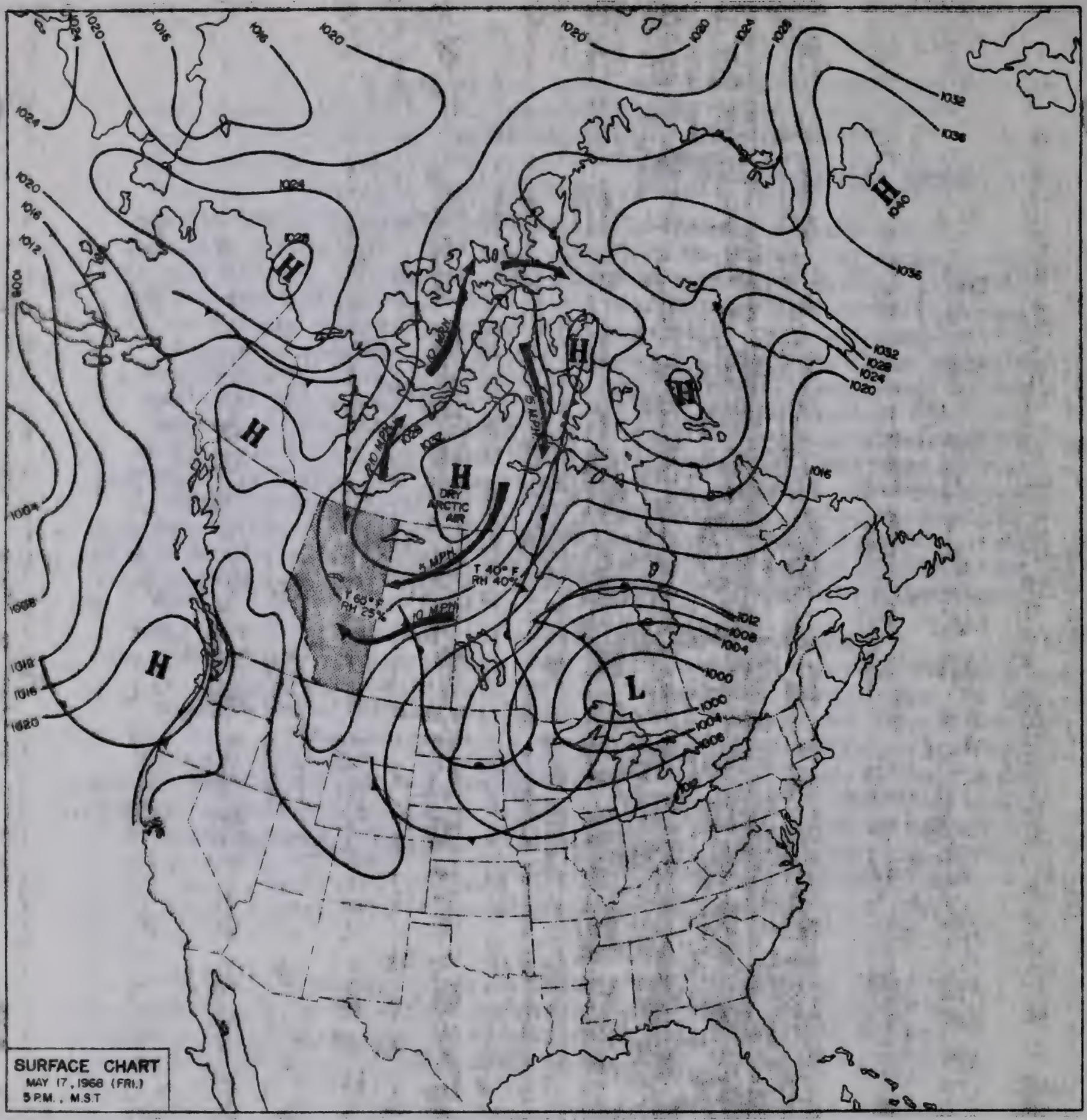
All fires were man-caused and originated mainly from land clearing and brush burning operations outside, adjacent to, and upwind of the forest protection boundary to the south. A few fires were caused by carelessness and a few possibly by incendiarism, but the major fires were initially lit by settlers taking advantage of the clear, warm weather over the long Victoria Day week-end to burn brush and windrows along the southern fringe areas of the coniferous zone. (see Fig. 3)

It is estimated that nearly 1,000 settlement fires were burning outside of the forest protection boundary on May 18th, in a narrow strip of land clearing operations that extended from Rocky Mountain House north to Whitecourt, and east to the Saskatchewan border.

IV. SHORT TERM WEATHER FACTORS

The synoptic weather situation which developed in mid May was instrumental in creating an ideal fire condition. The charts will show that a large high pressure area moved from the Arctic. Because this air mass originated over sea and land areas still snow and ice covered, the air was cool and dry. The system moved south and became blocked or stagnant over Manitoba. The blocked high pressure area now began to rotate slowly in a clockwise circulation and dry subsiding air on the east side of the high over Manitoba began to subside or settle to the surface, warming slowly by compression. This warm, dry air was then carried over the surface west into Saskatchewan and thence swept up in a northwesterly direction into central Alberta. The result was a strong, southeasterly flow of warm, dry air over all central Alberta. This weather block persisted for nearly seven days during which time the dry, southeasterly winds continued day and night. After nearly a week of this persistent weather pattern the flow finally began to erode and move east.

The dehydration and desiccation that occurred over the timber areas for each day that these dry, southerly winds blew was probably one of the most significant factors contributing to the fire blow-up conditions. For example, the Swan Hills area was subjected to these desiccating winds for five days before the fires reached the area. By that time the timber was extremely inflammable. It was also reported that black spruce muskegs had an ice layer still present about six inches below the surface. This created a situation where transpiration was not occurring to replenish moisture loss and consequently fire crowning in the needle foliage of spruce was intense.



V. DAILY WEATHER - May 17th to May 25th

FRIDAY - May 17, 1968

Friday was the day before the beginning of the long Victoria Day week-end and although the fire danger maps indicated the areas of highest danger (see Appendix) there was nothing on the weather charts to indicate that any serious trouble was developing.

The surface charts showed an intensifying Arctic high pressure area centered about 150 miles west of Baker Lake, Northwest Territories. A ridge from this extended southwest into Alberta. A light, easterly flow of warm air with low dew points began to influence the area. This produced low relative humidity over the entire Province.

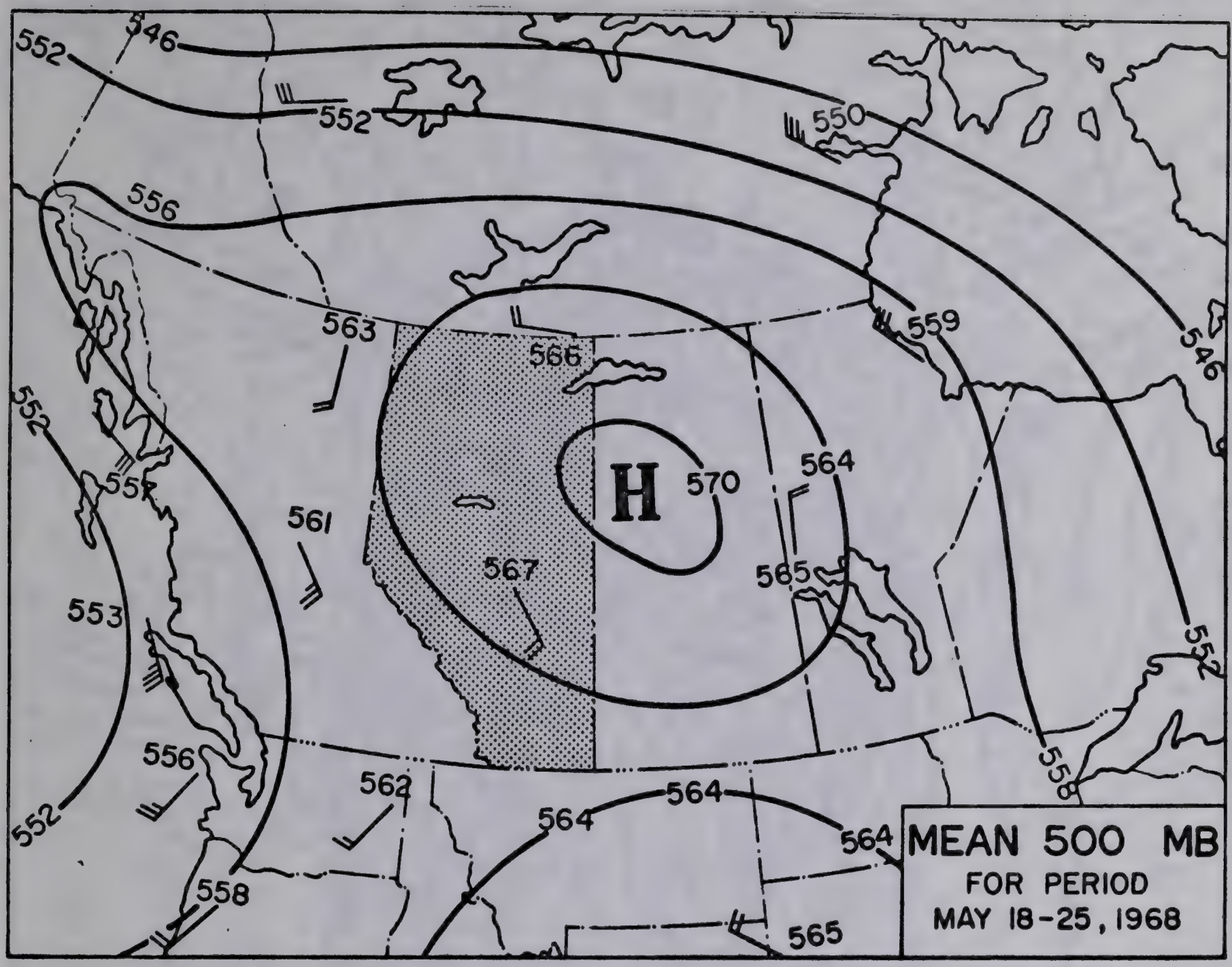


Fig.4

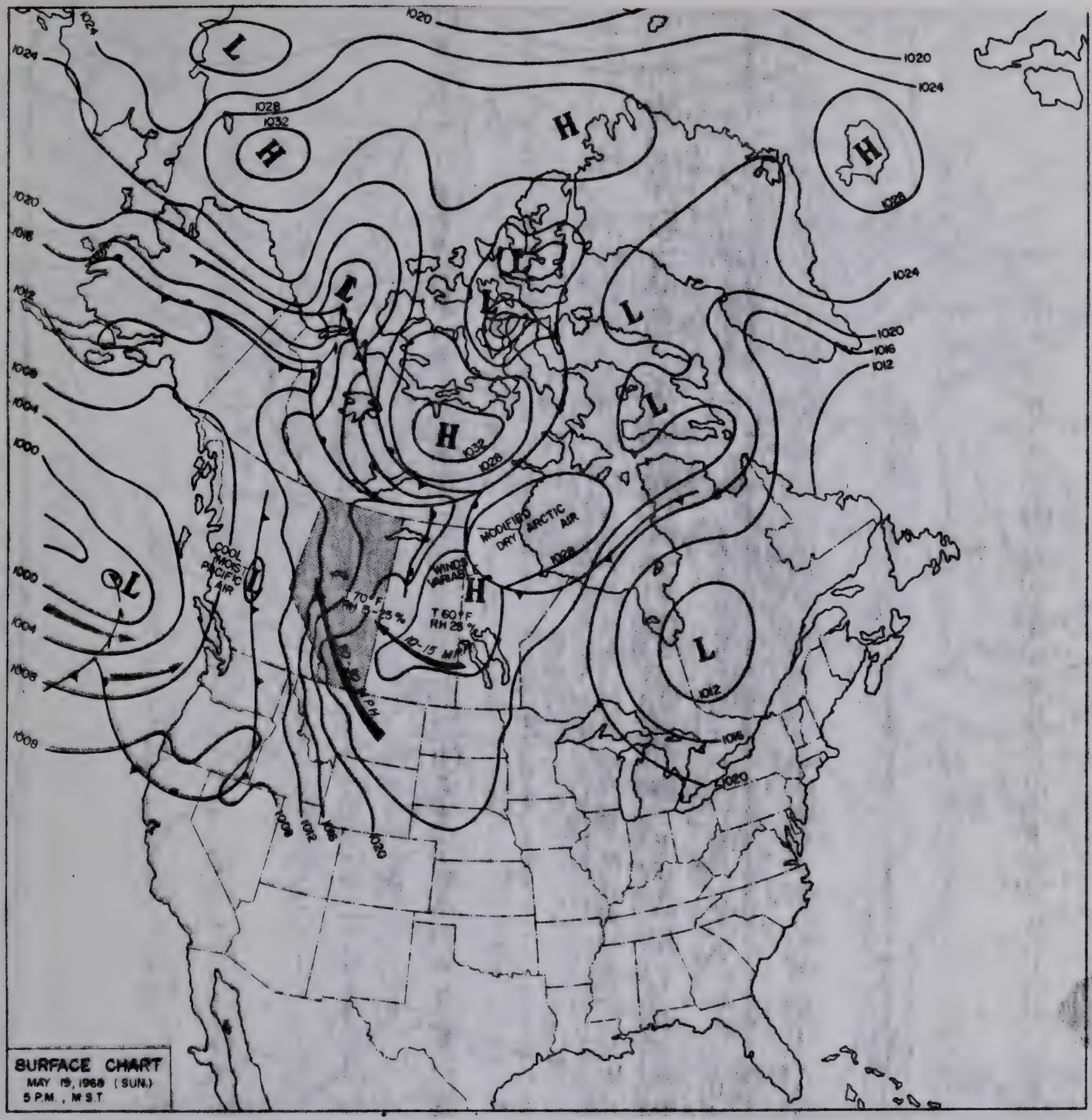
The upper air chart (Fig. 4) is a composite map for the period May 18 to 25, 1968. It is evident from this chart that Alberta and Saskatchewan were under the influence of a blocking high which, under these conditions, can be termed as an "Omega Block". The importance of this feature cannot be underestimated when studying the Alberta forest fires of May 1968. This Omega blocking high prevented cyclonic disturbances, and subsequent surges of moist, Pacific air, from entering the Prairie Provinces. The blocking action aloft also maintained the high pressure area over the eastern Keewatin District of the Northwest Territories together with a strong ridge which extended southward through the central Provinces. A southerly flow of warm, dry air at the surface was thus maintained across Alberta during this critical period.

(The 500 millibar pressure occurs at approximately 18,000 feet above sea level.)

SATURDAY - May 18, 1968

The Arctic high pressure area had moved south and was centered just south of Ennadai Lake, Northwest Territories, with a maximum pressure of 1,037 mb. A ridge from this system extended south and east of Alberta, thereby placing the Province in a return southeast flow of dry, modified Arctic air. The wind velocity increased as the gradient strengthened. The relative humidity of the Arctic air mass was very low because the main water bodies at the source region were still frozen and hence only limited moisture was available for absorption by the air mass. The trajectory of the southeast flow now affecting Alberta had followed a path through central Manitoba, across southern and central Saskatchewan and then into Alberta and northward.

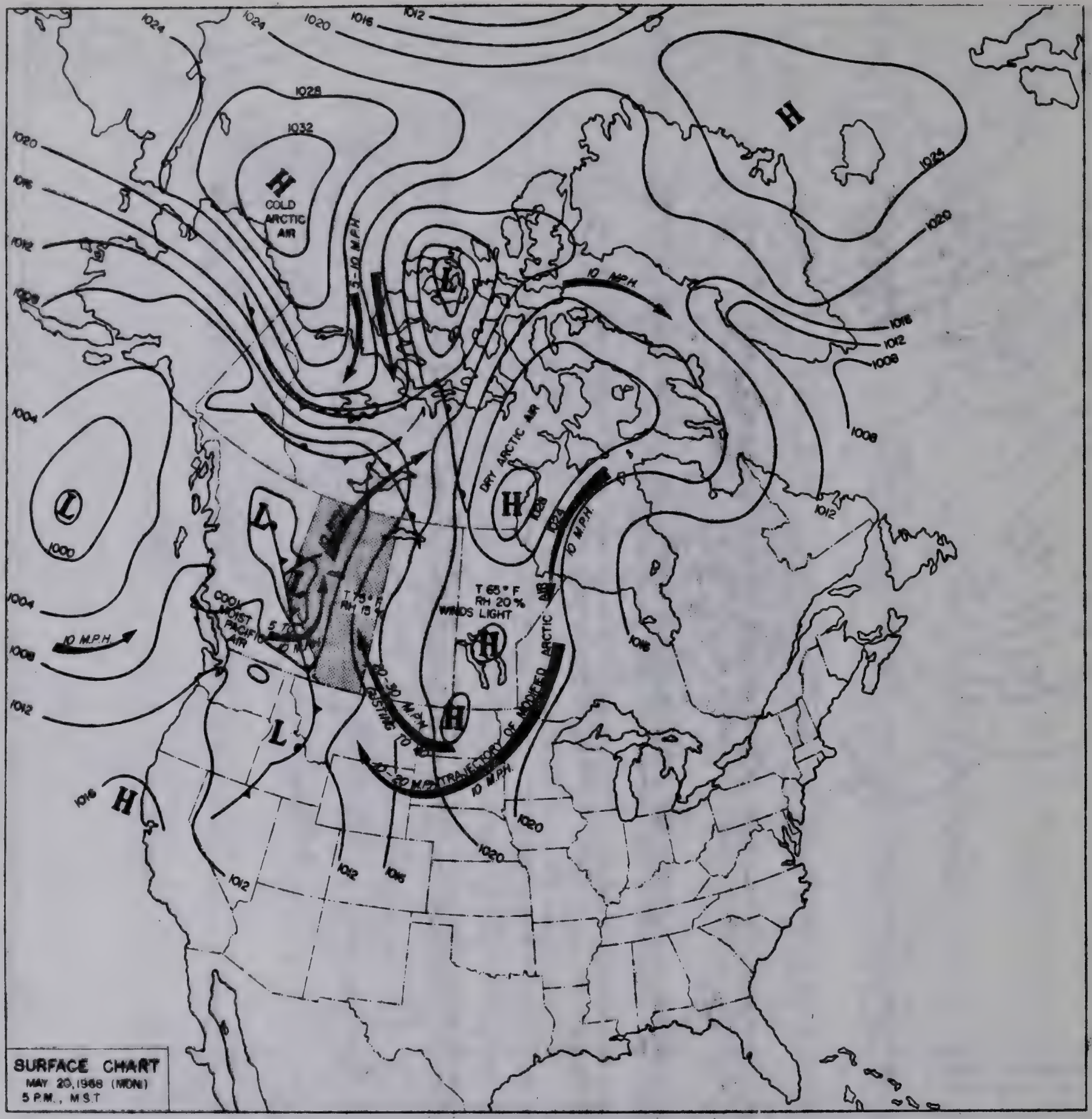
By late afternoon the dry, desiccating, southeasterly wind had become well established as the gradient further steepened with indications of a trough of low pressure forming along the foothills of the Rockies. This southeast flow diminished overnight and increased again the following day.



SUNDAY - May 19, 1968

By Sunday morning the drying effects were continuing to be felt throughout the Province and the morning weather (7:30 a.m.) from Forestry stations in the central regions was reported as clear, sunny and warm. A steady southeast wind 10 to 12 miles per hour was reported at almost all stations. Visibilities were reduced somewhat by smoke and haze. Temperatures averaged 50°F and humidities varied from 30 to 60 per cent.

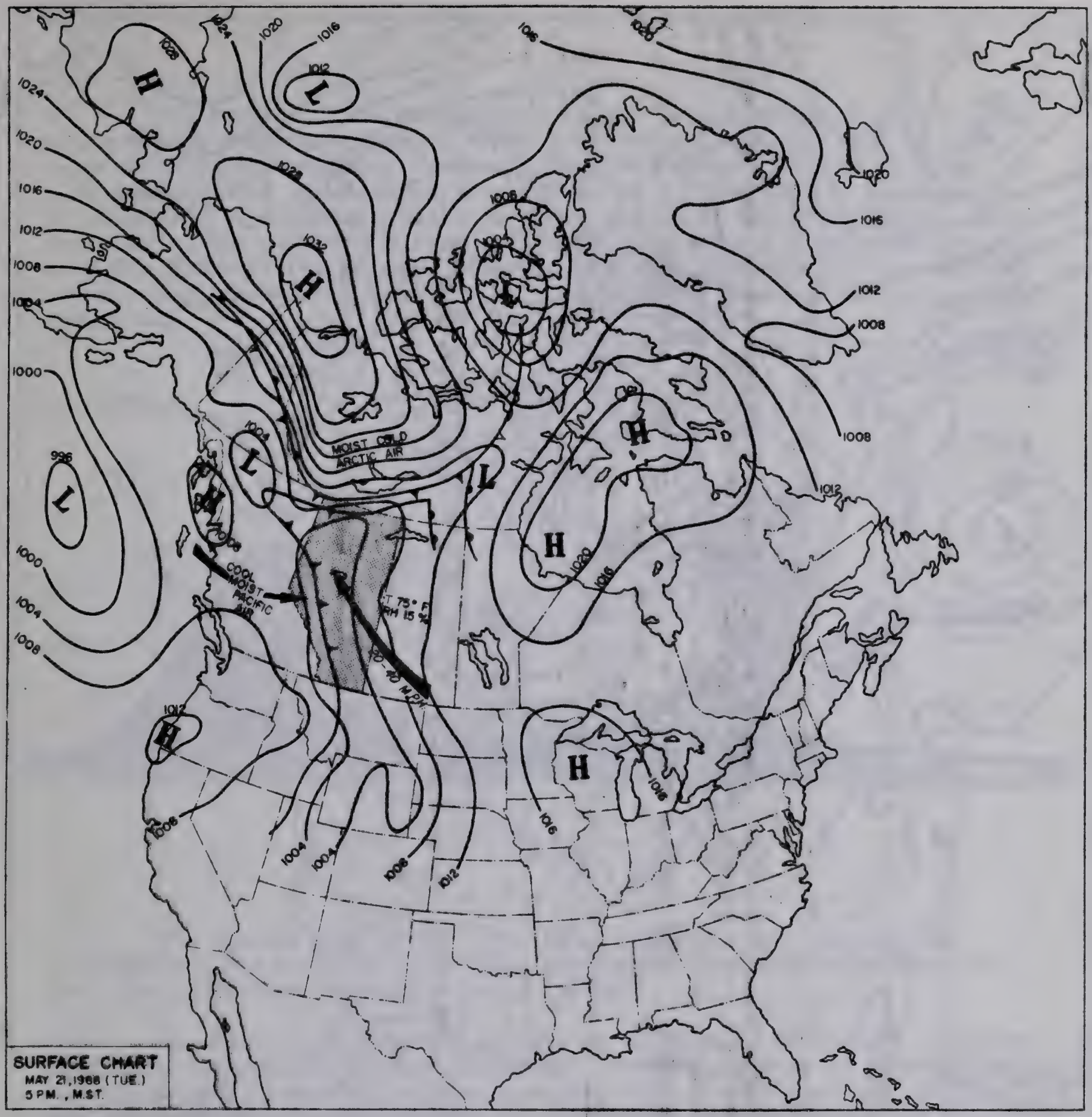
Surface winds increased slowly from the southeast during the late morning and early afternoon, with some Forestry stations in the western Forestry region reporting winds of 25 miles per hour with higher gusts. This, was combined with temperature readings in the high sixties and relative humidities in the twenties.



MONDAY - May 20, 1968

The air continued to modify and dry over Alberta as a good southerly flow became well established over the region. Surface winds began gusting early in the morning at many places with winds gusting up to 40 miles per hour during the afternoon. Relative humidities continued to drift lower with one Forestry station reporting a relative humidity of 7 per cent.

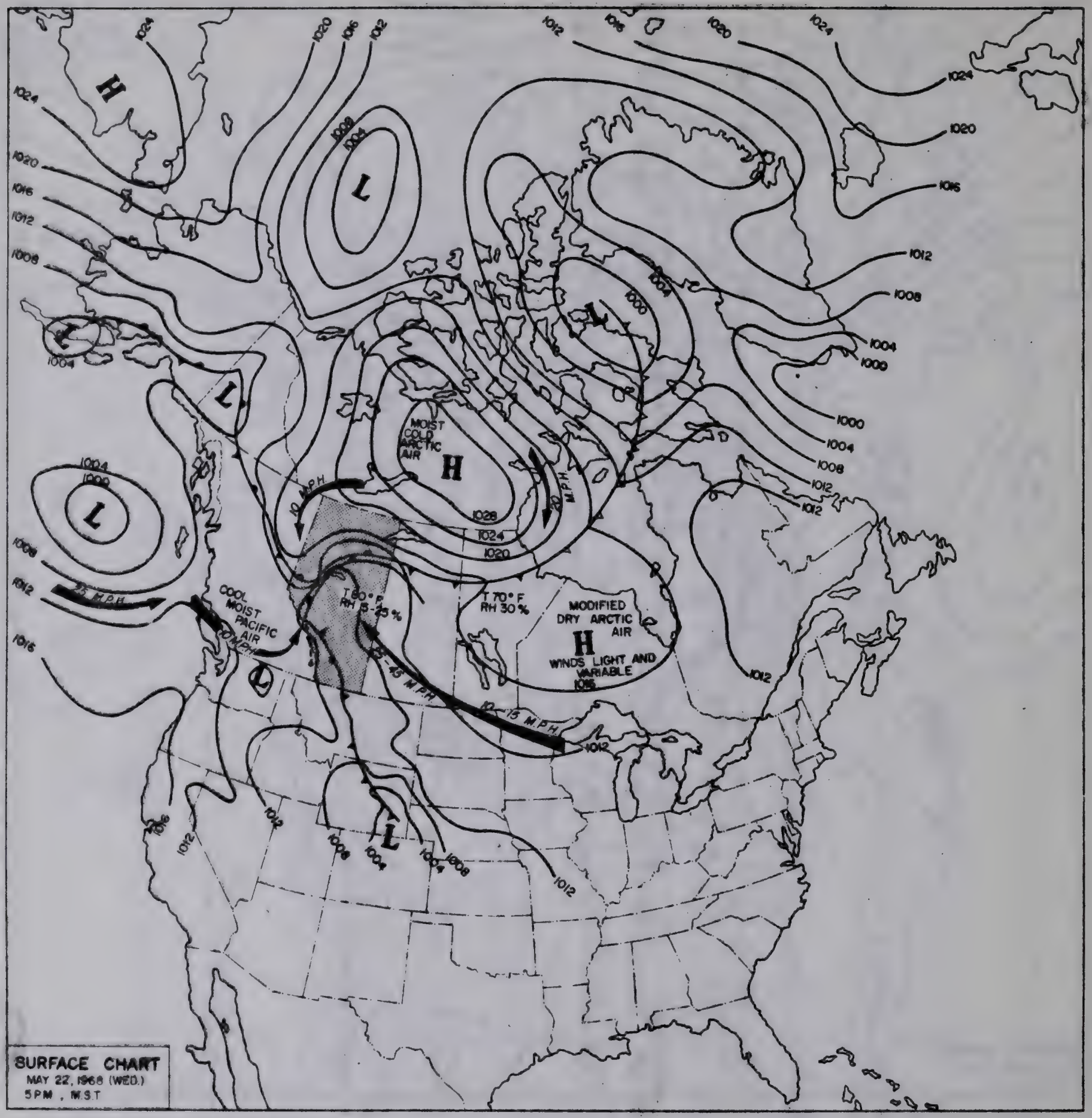
Cool, moist, Pacific air had advanced through the British Columbia interior and was about to break across the Rocky Mountains in the form of a cold front. A series of high pressure cells now lay over Manitoba, with a weak low pressure trough along the British Columbia-Alberta border. This situation was inducing a continuation of the strong southeasterly flow over Alberta.



TUESDAY - May 21, 1968

Tuesday morning began with clear skies and warm, dry southeast winds as usual. Temperatures at 7:00 a.m. averaged 55°F, relative humidities ranged from 35 to 45 per cent, winds were steady from the southeast 10 to 15 miles per hour, with a few stations reporting gusts above 20 miles per hour. Visibilities were being drastically reduced in the Slave Lake and Whitecourt regions to as low as one mile in smoke.

An exception to this weather was the narrow band along the eastern foothills regions where the cool, moist air from British Columbia was starting to push eastward over the Rockies. Along the edge of this cool air a few showers and thunderstorms developed. This cool air was unable to penetrate very far, however, due to the blocking high over the Prairies. By evening cold, Arctic air which had been building over the MacKenzie River Valley during the previous twenty-four hours began to push southward into northeastern British Columbia and northern Alberta.



WEDNESDAY - May 22, 1968

Wednesday morning started out with the very interesting combination of three separate air masses struggling for dominance over central Alberta. To the north, very cold air was surging down from Yukon-Northwest Territories region, dropping temperatures in the High Level Forestry regions to the mid twenties by 7:00 a.m. This was accompanied by strong, northerly winds and a few snow flurries. To the west of Alberta, the cool, moist, Pacific air was still endeavoring to push eastwards from the Rockies, being effectively blocked by the hot, dry, southeast flow of returning air on the west side of the high situated over northeast Manitoba.

The surface charts showed the cold air mass from the MacKenzie River Valley moving down into northern Alberta but becoming stalled on a line 70 miles north of Fort McMurray to Grande Prairie and south of Fort St. John. A second front lay south of the Arctic front on a line from Fort McMurray to 50 miles west of Wagner and Whitecourt near Edson and south of Calgary. This front marked the boundary of the cool, moist, Pacific air mass which was trying to push across Alberta from the Interior of British Columbia. This Pacific air mass was almost stationary as the upper blocking high was extremely slow in moving away.

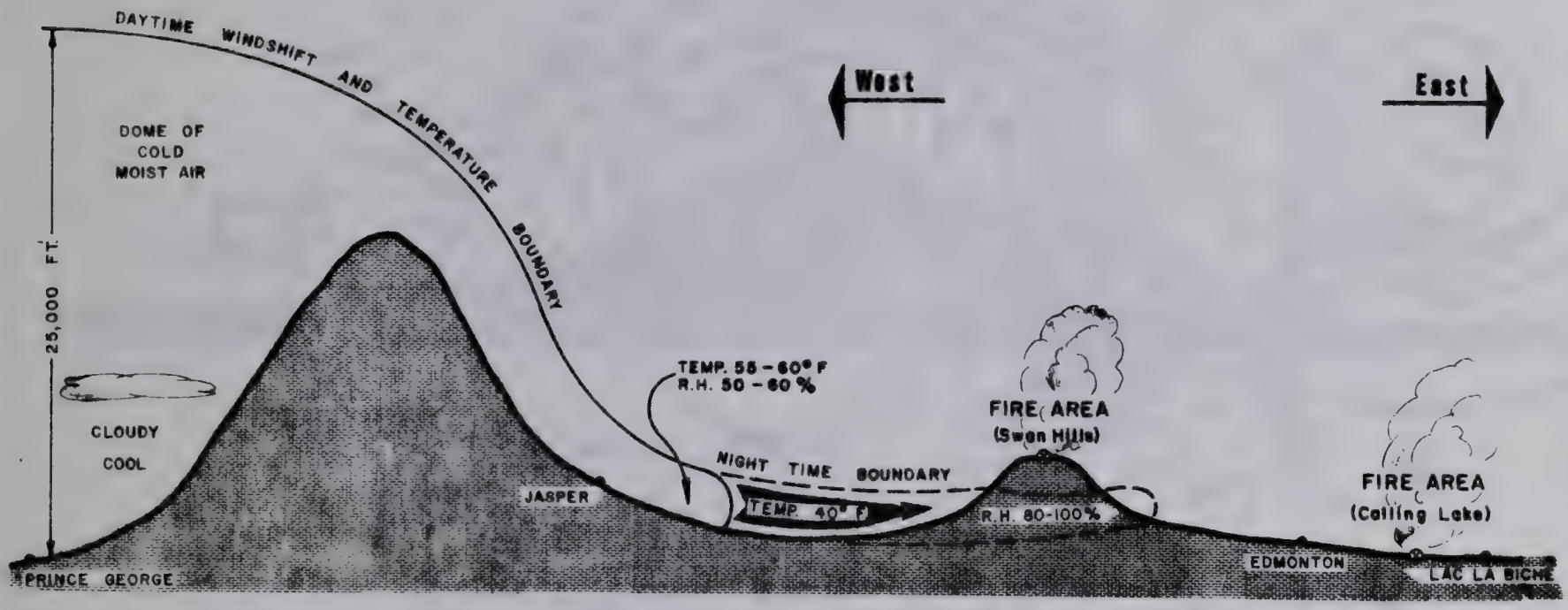


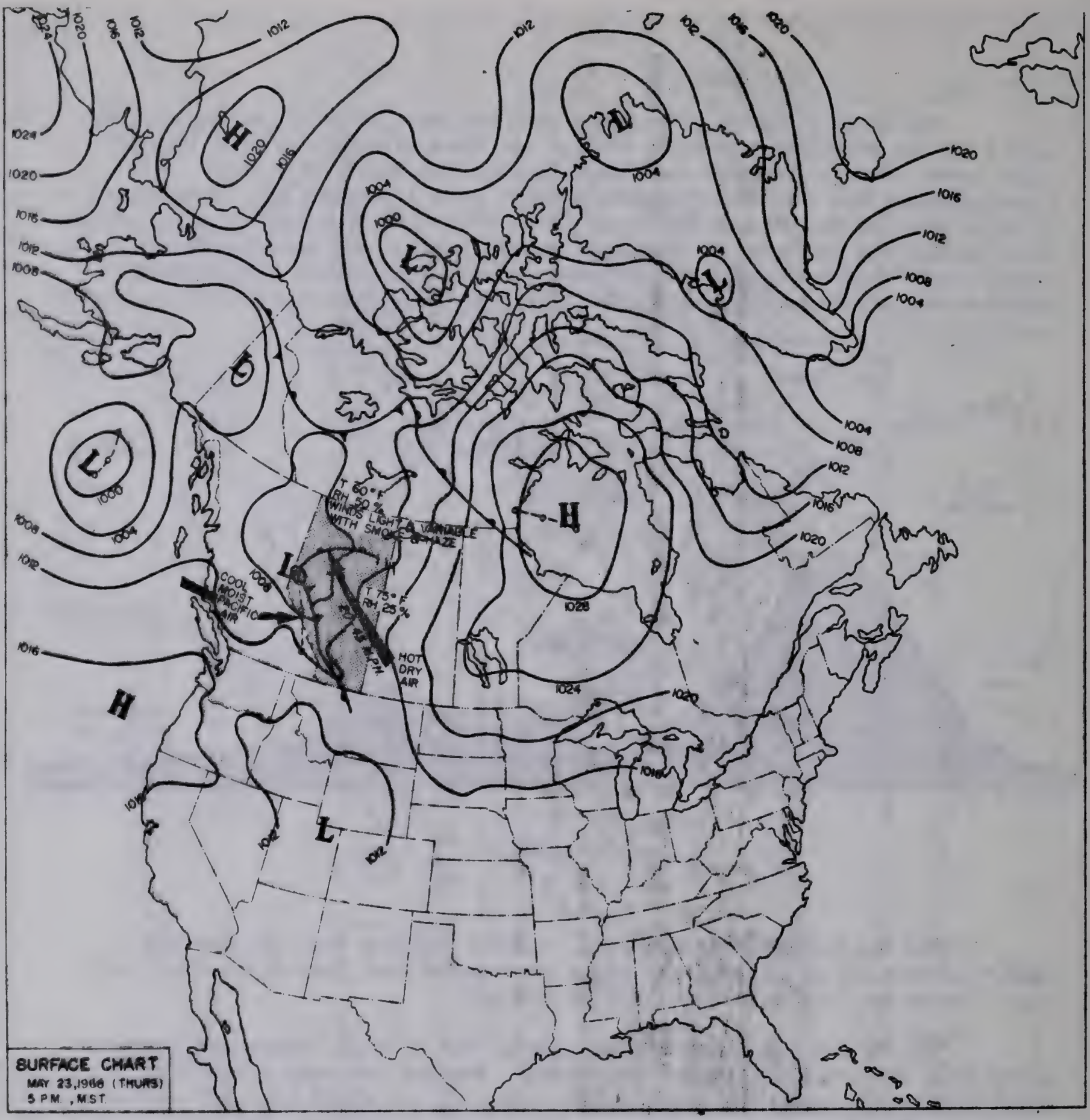
Fig.5a

The leading edge of the cool, Pacific air was very shallow and unfortunately did not affect the upper portions of the Swan Hills (Fig. 5a) where the major fire was raging out of control.

The Pacific air was able to move as far east as Whitecourt overnight aided by a very shallow surface inversion. However, as soon as the sun rose, surface heating commenced, and the layer of cool air would burn off and the cold front would once again appear in its original position along the foothills of the Rocky Mountains.

When this phenomena first occurred, it initially misled the forecasters into believing that the front was actually moving eastwards across Alberta, when in fact it was not.

A weak wave on this Maritime front had developed during the past twenty-four hours and was now situated about 80 miles southeast of Jasper, moving northwest. The wave was caught up in the southerly flow on the west side of the 500 mb. blocking high which was finally showing signs of weakening. Until this wave had moved to the north of the forest fires, no relief could be expected from the present critical situation.

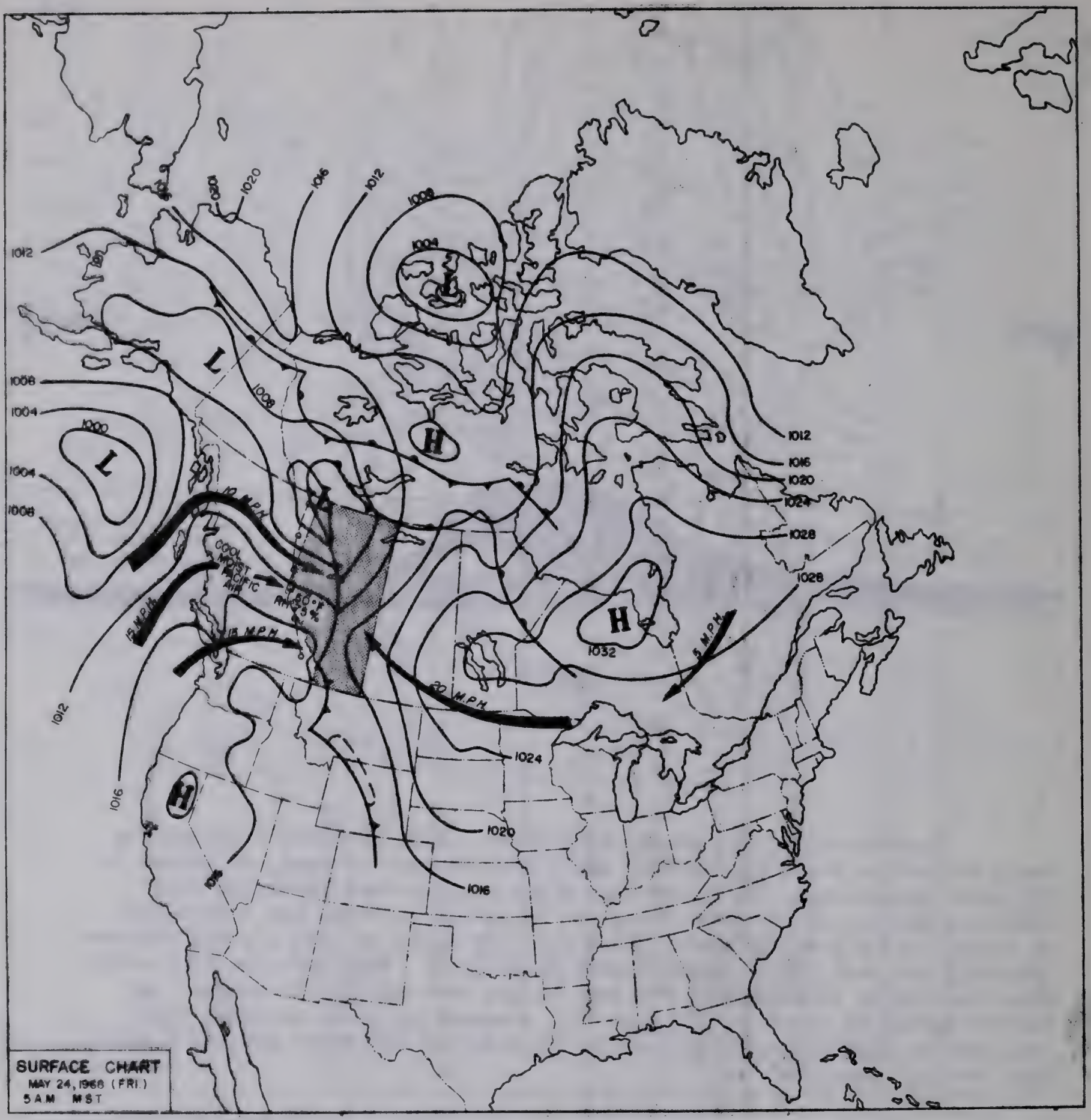


THURSDAY - May 23, 1968

Thursday turned out to be the most critical day in the respect to the large Swan Hills fire, as the warm, dry air ahead of the developing wave, which had now moved to Grande Prairie again began to surge north. Forestry stations in the Edson district were reporting winds of 25 miles per hour gusting to 50 miles per hour. It was on this Thursday afternoon that the Slave Lake fire made its biggest run through the Swan Hills by extending itself northwest by an additional forty miles. Plans were made at this time to evacuate residents along the south shore of Lesser Slave Lake.

Fig.5b

Thursday night was the turning point. Shortly after midnight the south easterlies began to diminish and a shallow pool of cool air formed in the lower elevations. Strong surface winds at night had prevented this condition earlier in the week, however, by 2:00 a.m. winds had diminished to south 3 miles per hour and by 7:00 a.m. the layer of cool air had deepened to nearly 900 feet thick in the Lesser Slave area. This left the fire area above the top of inversion in the Swan Hills, but effectively stopped any further spread to the north. (Fig. 5b) A weakening south easterly wind continued to flow above the inversion level during the night and for a brief time the next morning.



FRIDAY - May 24, 1968

On Friday morning the cool, Pacific air began to move slowly across central Alberta behind the "foothills wave" now recurving towards the northeast. By afternoon the cool, moist air had effectively dampened the fire spread in the Whitecourt-Slave Lake region.

The Lac La Biche region, on the other hand, remained in the warm sector with gusty, southeast winds. At some places a shift in wind was noted from southeast to southwest with no decrease in speed. This, it is thought, was caused by a change in the isobaric pattern ahead of the advancing cold front and temporarily created a serious situation as the leading edge of the fire began to advance northeastward.

SATURDAY - May 25, 1968

By Saturday morning, the southerly flow was broken as the cool, Pacific air moved across central Alberta. Forestry areas in Whitecourt and Slave Lake had cool inversions in the morning, humidities were in the high eighties and the wind was light and variable. At 7:00 a.m. all aircraft activity was suspended with visibilities reduced to two to three miles in smoke. Low and middle layer cloud was reported from many stations and light drizzle and rain showers reported at others. By noon, day time heating had caused the layer cloud to break somewhat and by 1:00 p.m. convective cloud was reported at almost all stations with heavy cumulus and thunderstorms in Slave Lake and Whitecourt. Afternoon humidities were quite variable with scattered shower activity in all regions. Relative humidities ranged from 60 to 100 per cent, wind speeds were light and variable and temperatures averaged 55^{o}-60^{o}F.

The fire spread had ceased as soon as the wind had diminished and the relative humidity rose as the result of the cold frontal passage. During the next few days, no appreciable precipitation occurred, except isolated showers from thunderstorms, and the tedious job of mopping up the fires commenced. Whitecourt received its first welcome rain on May 27th. This rain spread into the Slave Lake and Lac La Biche regions on the following day thereby ending the most disastrous early forest fire season on record.

How often does this critical blocking weather pattern occur? -To answer this, we refer to the excellent report on the identification of weather patterns associated with critical fire weather made by Mark Schroeder in 1964.(1) The frequency of occurrence of these fire weather patterns was reported by Melvin K. Hull in 1966.(2) In Hull's report, ten years of synoptic weather maps (1951-60) were studied to determine the monthly frequency of each of the major weather types on a year around basis.

Nearly all critical fire weather types were shown to be associated with surface high pressure systems or strong ridges. The origin of the high pressure areas is shown on Fig. 6. The anticyclone which caused the 1968 spring fire problems in Alberta originated about mid way between the area designated northwest Canada and Hudson Bay region and is best classified as a Hudson's Bay type. They are recorded as occurring less frequently than the four eastern types but they last almost as long as the others. The Hudson Bay high type shows a distinct seasonal variation in occurrence. (Fig. 7)

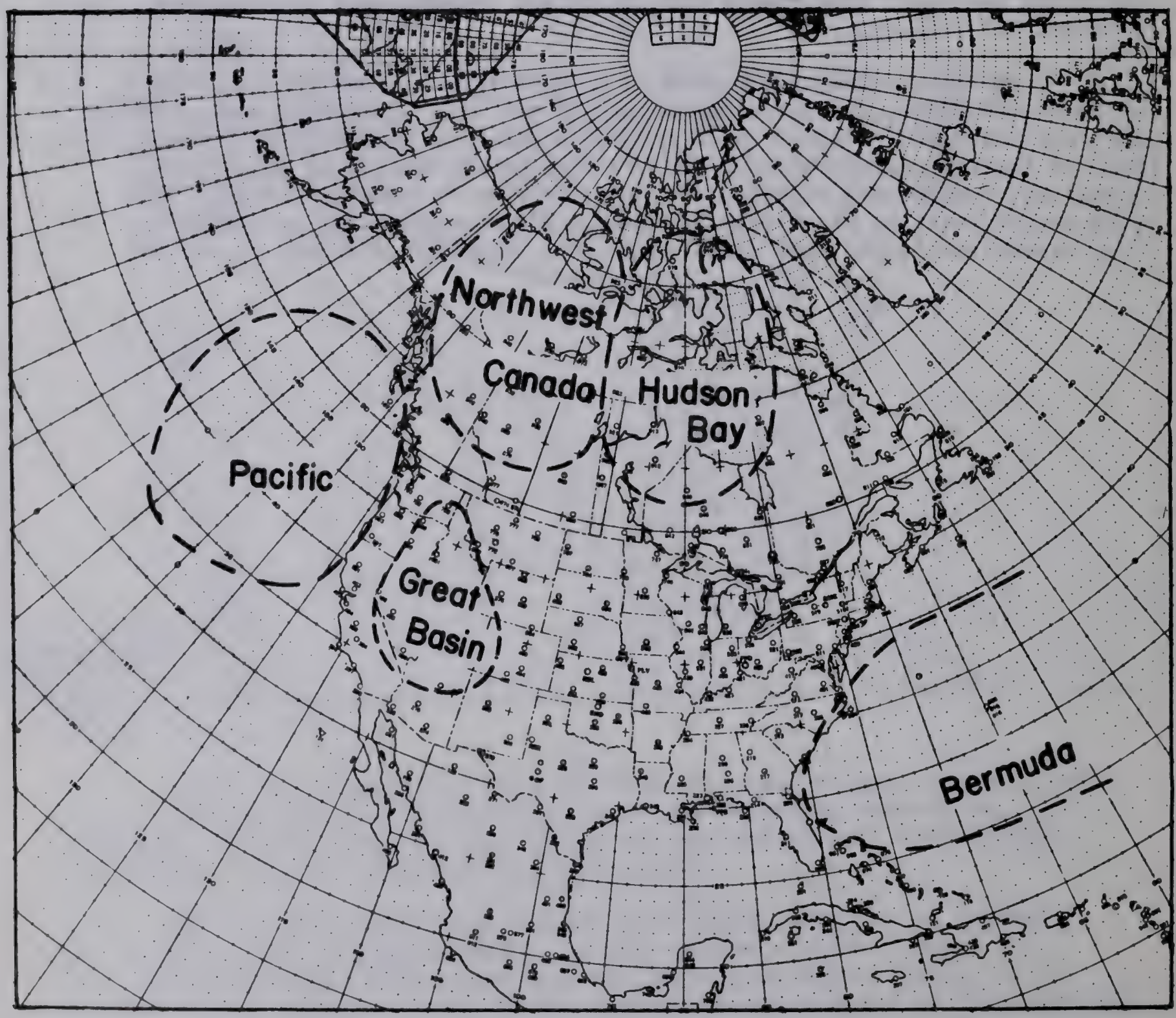


Fig. 6

Designation for origin or location of surface anticyclone.
(From Schroeder, 1964)

Hudson Bay High, regions east of the Rockies, 1951-1960[2]

FIG. 7

Month	Number of Cases	Range-Days Minimum	Range-Days Maximum	Mean Duration	Standard Deviation
January	9	4	10	7.0	2.0
February	9	1	10	5.3	2.7
March	18	2	12	6.5	2.4
April	16	3	12	6.0	2.4
May	18	1	11	7.0	2.6
June	14	2	10	6.4	2.4
July	8	4	10	7.0	1.8
August	12	3	9	6.1	1.7
September	11	4	12	6.7	2.3
October	12	2	8	4.0	1.7
November	8	3	8	4.8	1.5
December	6	3	9	6.0	1.8
Total	141				

"Not only is this type more likely to occur in the spring and fall, but those cases occurring in the spring lasted longest by 3 to 4 days in some cases." Schroeder further observes: "Although the descriptions of fire weather types given here should be helpful in prediction, they cannot be used blindly." He further states: "Air mass properties in source regions still differ with seasons and with changes in the character of the underlying surfaces. A Hudson Bay high type, for example, may look much the same in summer and winter if only the pressure pattern is considered. In the winter time, however, the air mass may be much too cold to produce a critical fire weather situation.

Even during a single season, changes in the character of the earth's surface in the source region will alter air mass properties. In early spring while Hudson Bay is ice-covered, the overlying air mass will tend to be cool but quite dry; later in spring after the ice has melted, the air mass will be somewhat warmer and more moist.

Changes in the character of the surface over which the air mass subsequently travels must also be considered. Again using the Hudson Bay high type as an example, in the spring of the year, the air mass will not pick up much moisture in moving from its source region south. In summer however, after many small lakes over which it travels have warmed up, and vegetation and trees have begun or accelerated their growth, evaporation and transpiration will add considerable moisture to the air mass and make the fire danger less severe."

It should be emphasized that although the Hudson Bay high is common in the spring, the strong, persistent winds are not necessarily a common feature. Many identical high pressure patterns have occurred previously without producing these strong, southerly winds.

Literature Reference

(1) Synoptic Weather Types Associated with Critical Fire Weather (1964) by Mark J. Schroeder, et al., United States Forest Service, Berkeley, California.

(2) Critical Fire Weather Patterns .... Their Frequency and Levels of Fire Danger (1966) by Melvin K. Hull, et al., United States Department of Agriculture, Berkeley, California.

SUMMARY

This report has shown the five major factors that produced the May fires were:

1. A prolonged and severe drought the previous summer.

2. A mild winter with insufficient spring rainfall.

3. The early exposure of vast areas of inflammable dry grass.

4. A large number of mainly uncontrolled fires burning outside of the forest areas.

5. A persistent weather block that produced strong, dry winds.

Beginning with the extended drought of the previous summer, each factor added to the development of an increasingly explosive fire danger, until May 18, 1968, when the situation finally erupted.

It is rare that all the five major factors which contributed to the fire situation of May 1968, would occur simultaneously in any one year. Usually one or another is missing in the sequential order of events, which in turn would lessen the chances of a similar outbreak.

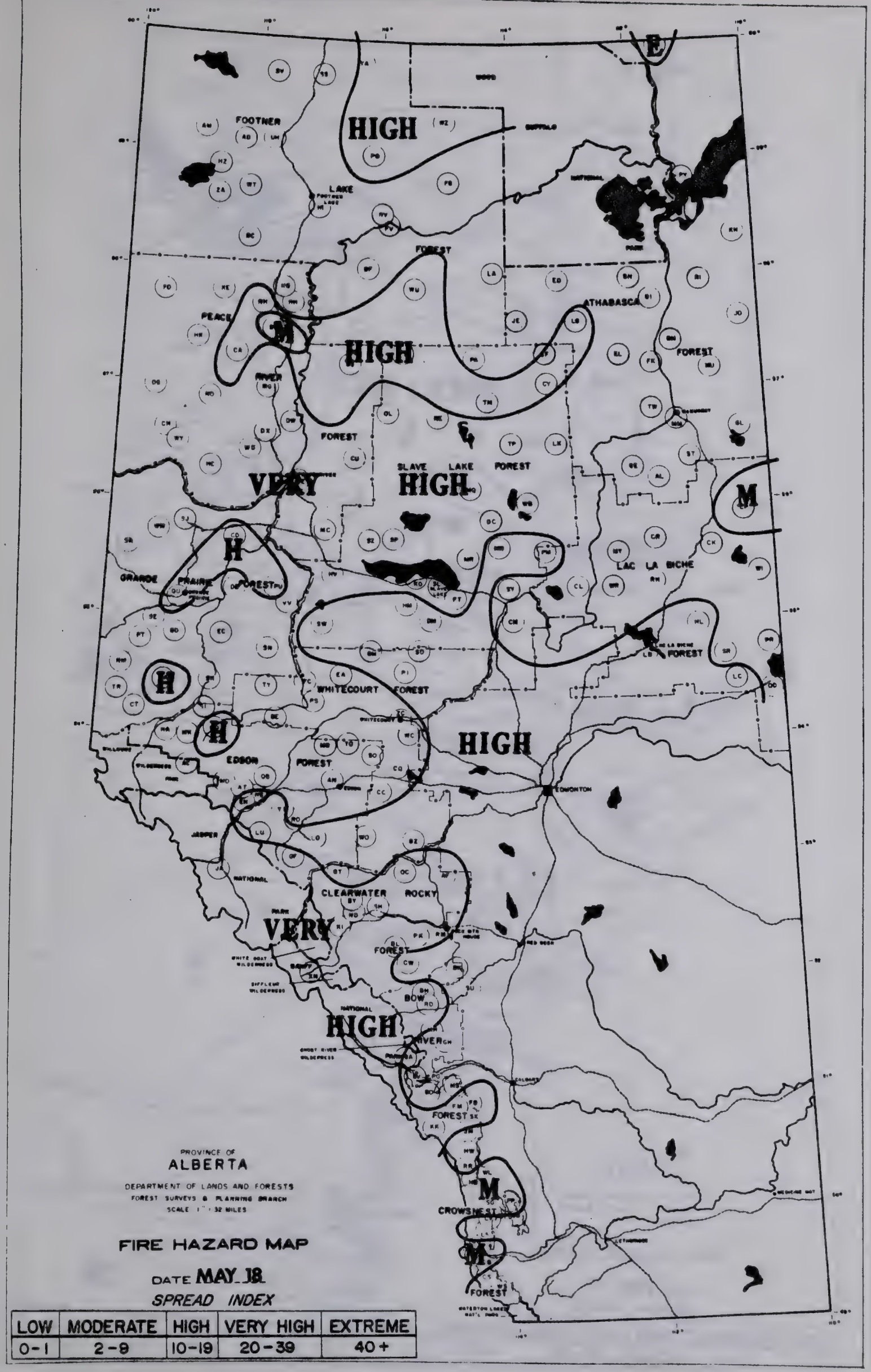
The purpose of this report has been to chronicle the chain of events that led up to this fire disaster. Each major factor has been identified to help recognize them in the future.

A P P E N D I X

SPREAD INDEX CHARTS

These charts show the daily fire hazard for flash forest fuels at all Forest Service weather stations throughout the Province, daily at 1:00 p.m.

The Spread Index measures the probable moisture content of fast drying fuels such as grass, leaves, tree, moss and small twigs. It is calculated using temperature, relative humidity, and wind speed.



PROVINCE OF
ALBERTA

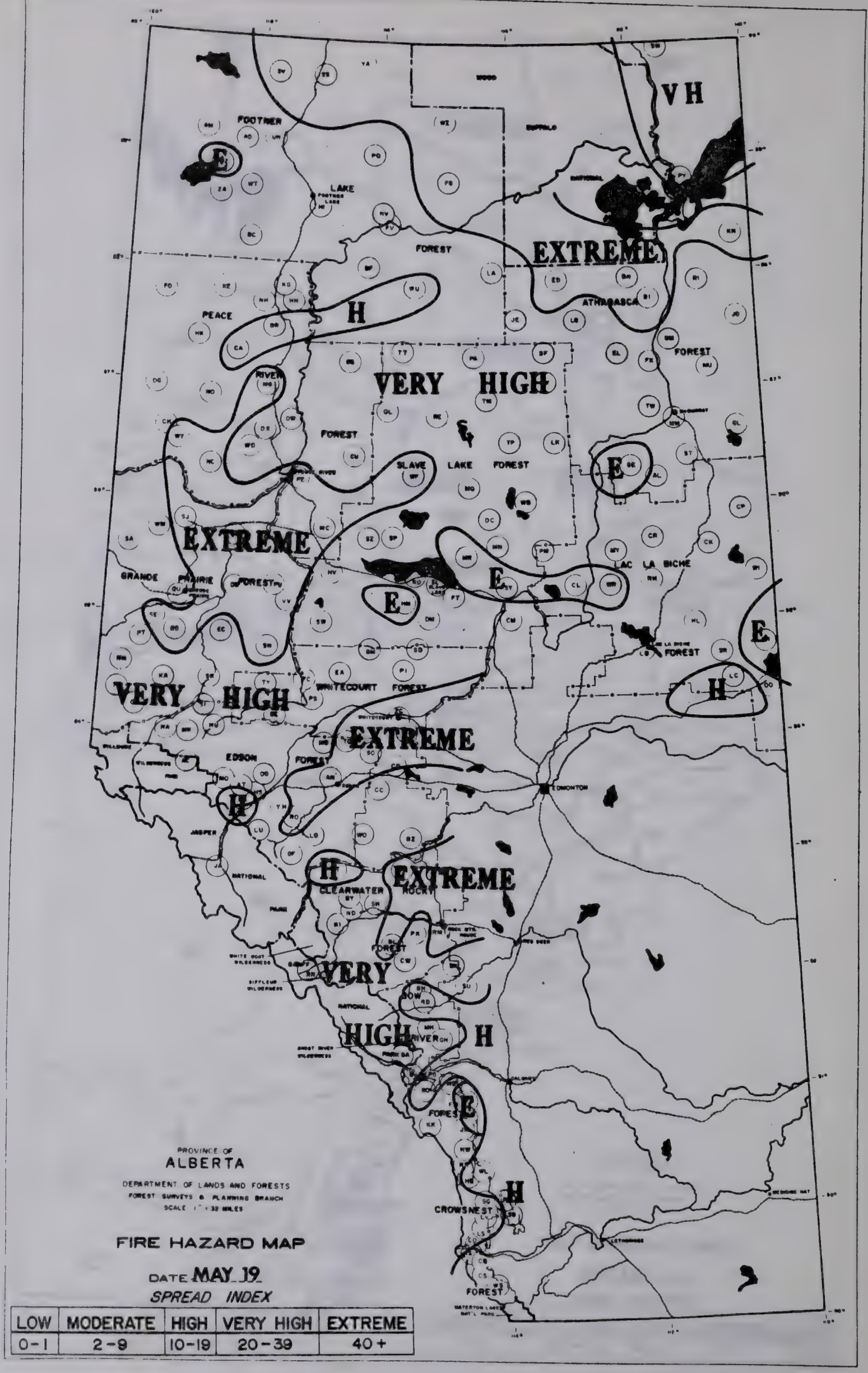
DEPARTMENT OF LANDS AND FORESTS
FOREST SURVEYS & PLANNING BRANCH
SCALE 1" = 32 MILES

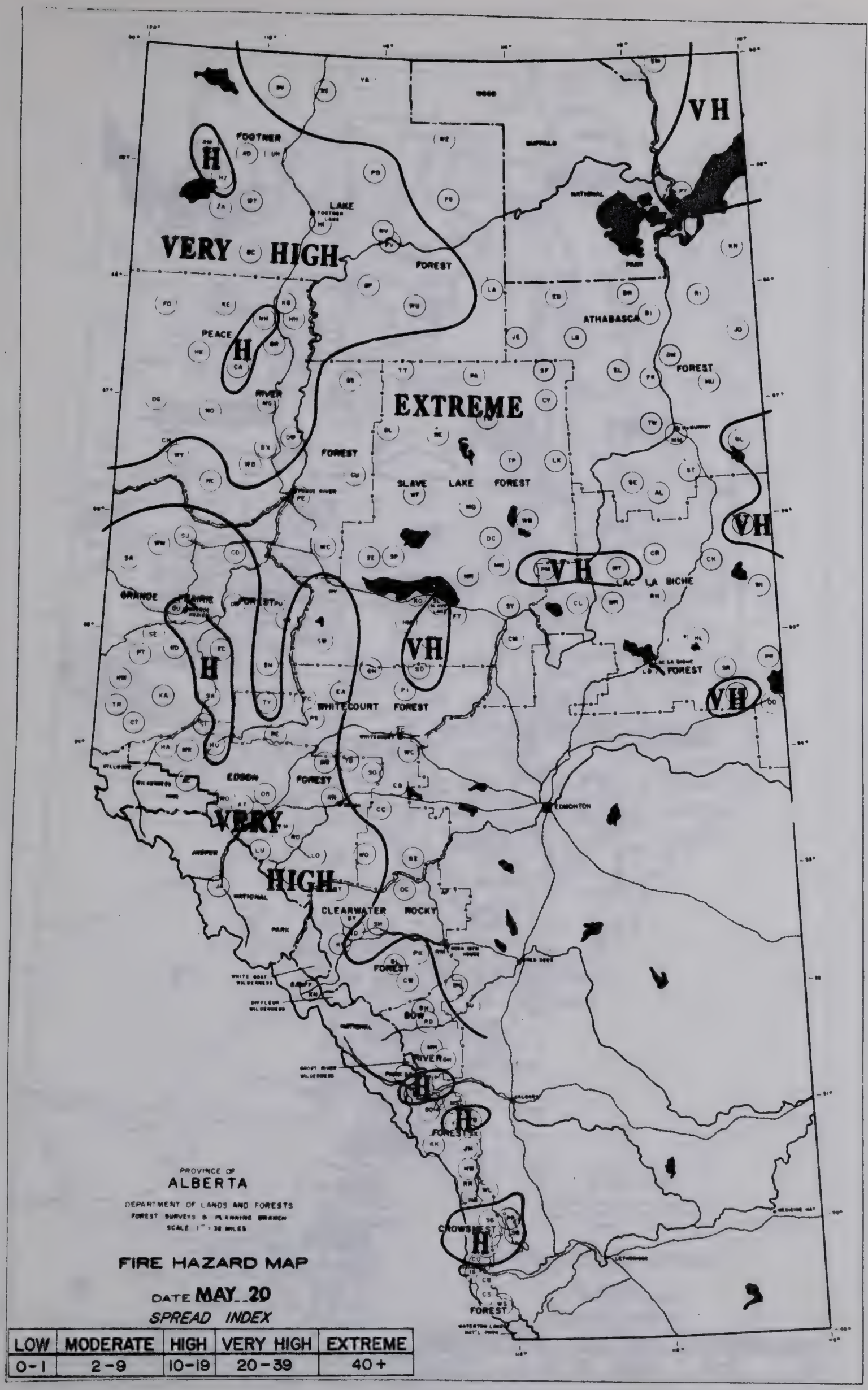
FIRE HAZARD MAP

DATE MAY 18

SPREAD INDEX

LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-1	2-9	10-19	20-39	40+


VH
FOOTNER
LAKE
FOREST
EXTREME
H
PEACE
RIVER
VERY HIGH
FOREST
SLAVE LAKE FOREST
E
EXTREME
GRANDE PRAIRIE FOREST
LAC LA BICHE
FOREST
VERY HIGH
WHITECOURT FOREST
EXTREME
EDSON
FOREST
EDMONTON
H
CLEARWATER
EXTREME
ROCKY
FOREST
VERY
HIGH
H
FOREST
H
CROWSNEST
FOREST
PROVINCE OF
ALBERTA
DEPARTMENT OF LANDS AND FORESTS
FOREST SURVEYS & PLANNING BRANCH
SCALE 1" = 32 MILES
FIRE HAZARD MAP
DATE MAY 19
SPREAD INDEX
LOW
MODERATE
HIGH
VERY HIGH
EXTREME
0-1
2-9
10-19
20-39
40+



PROVINCE OF
ALBERTA

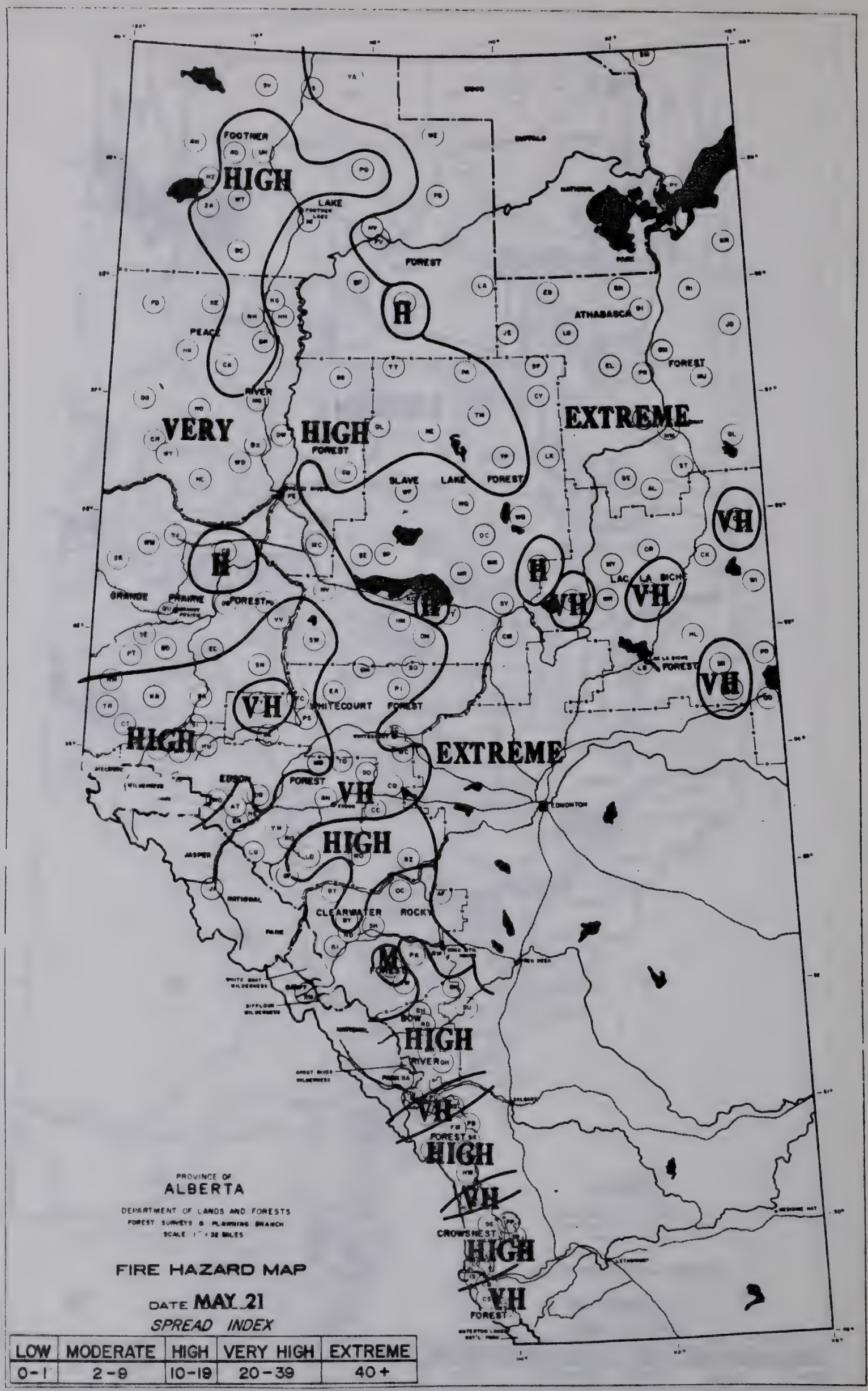
DEPARTMENT OF LANDS AND FORESTS
FOREST SURVEYS & PLANNING BRANCH
SCALE 1" = 30 MILES

FIRE HAZARD MAP

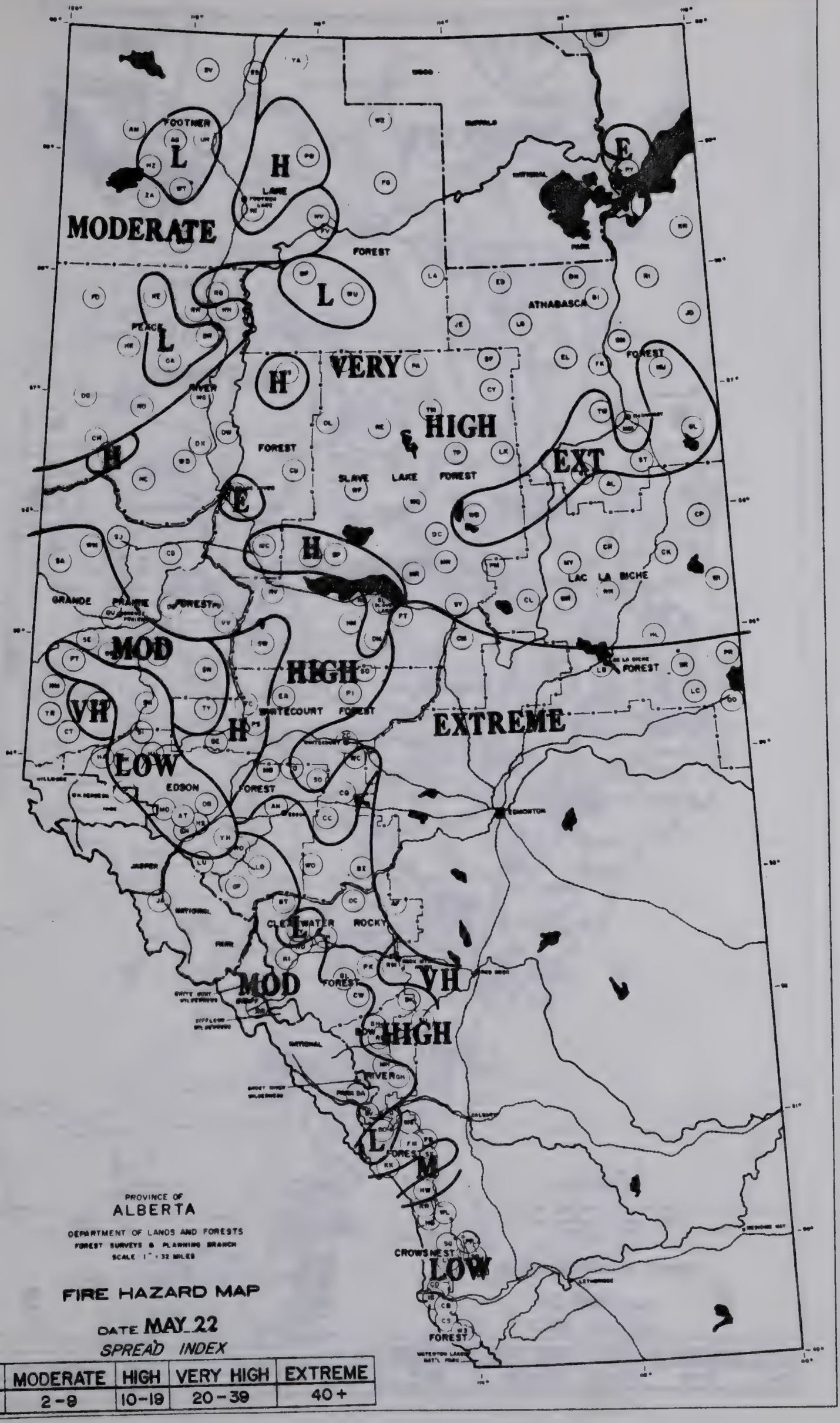
DATE MAY 20

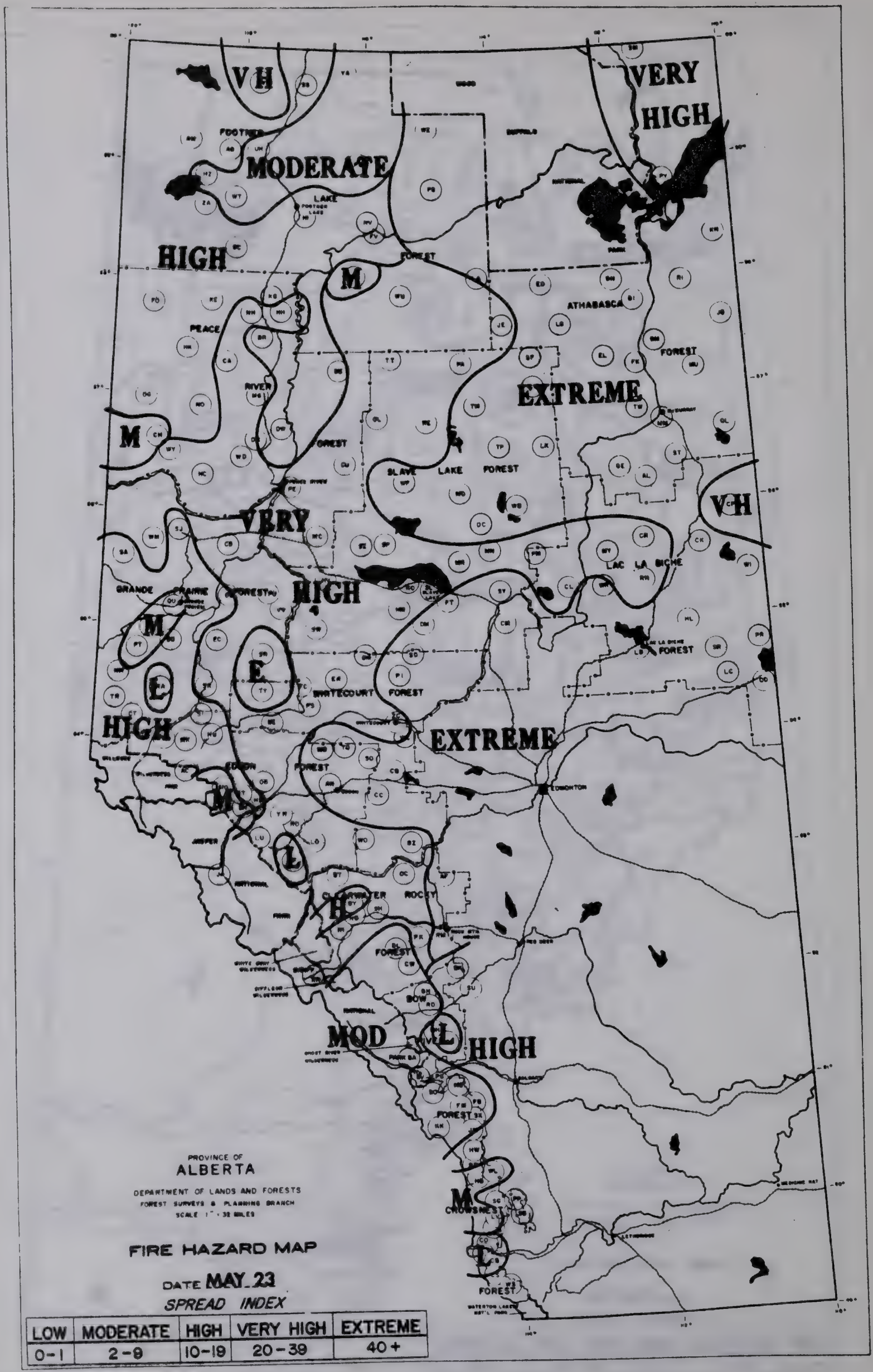
SPREAD INDEX

LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-1	2-9	10-19	20-39	40+

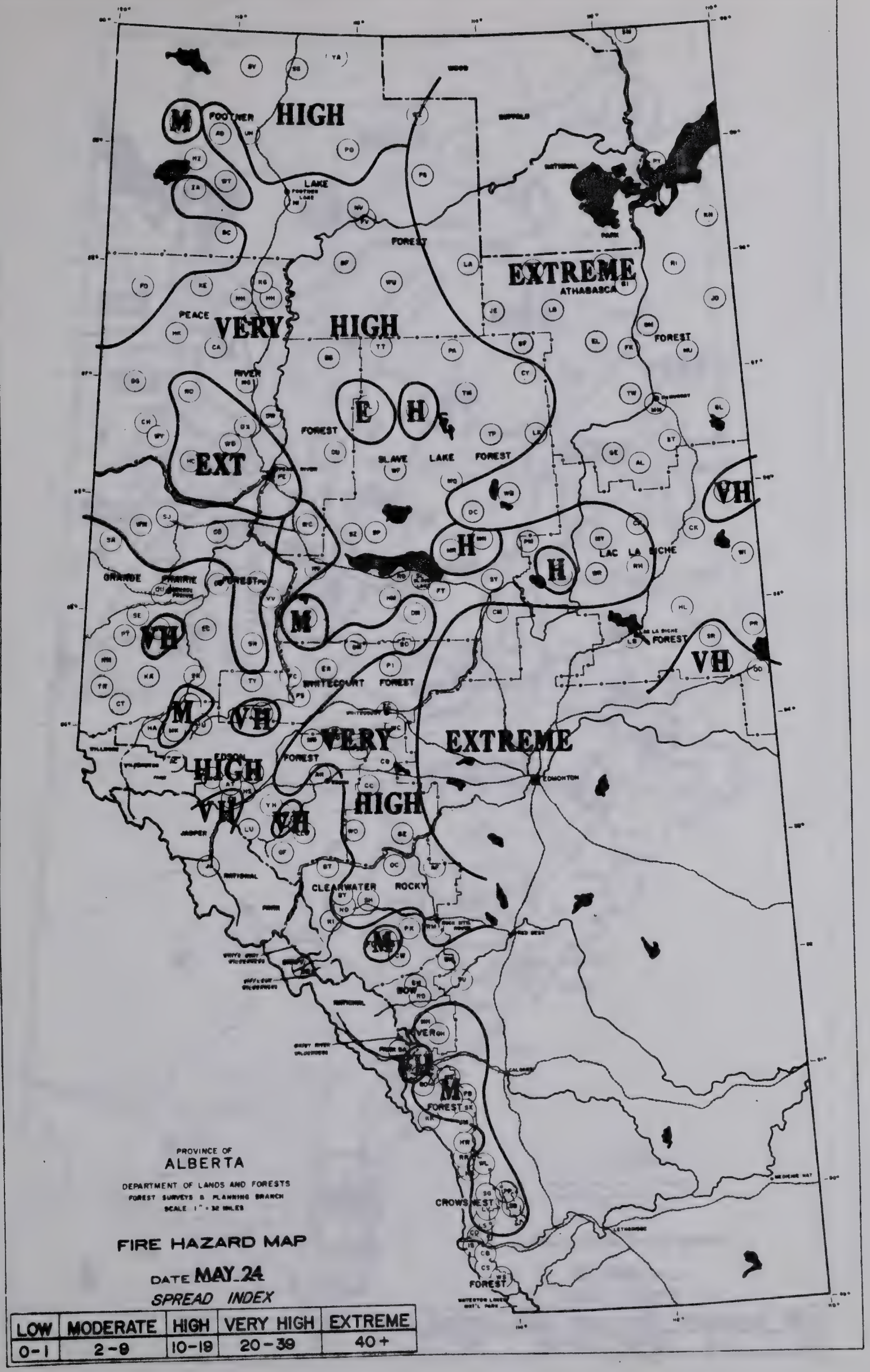


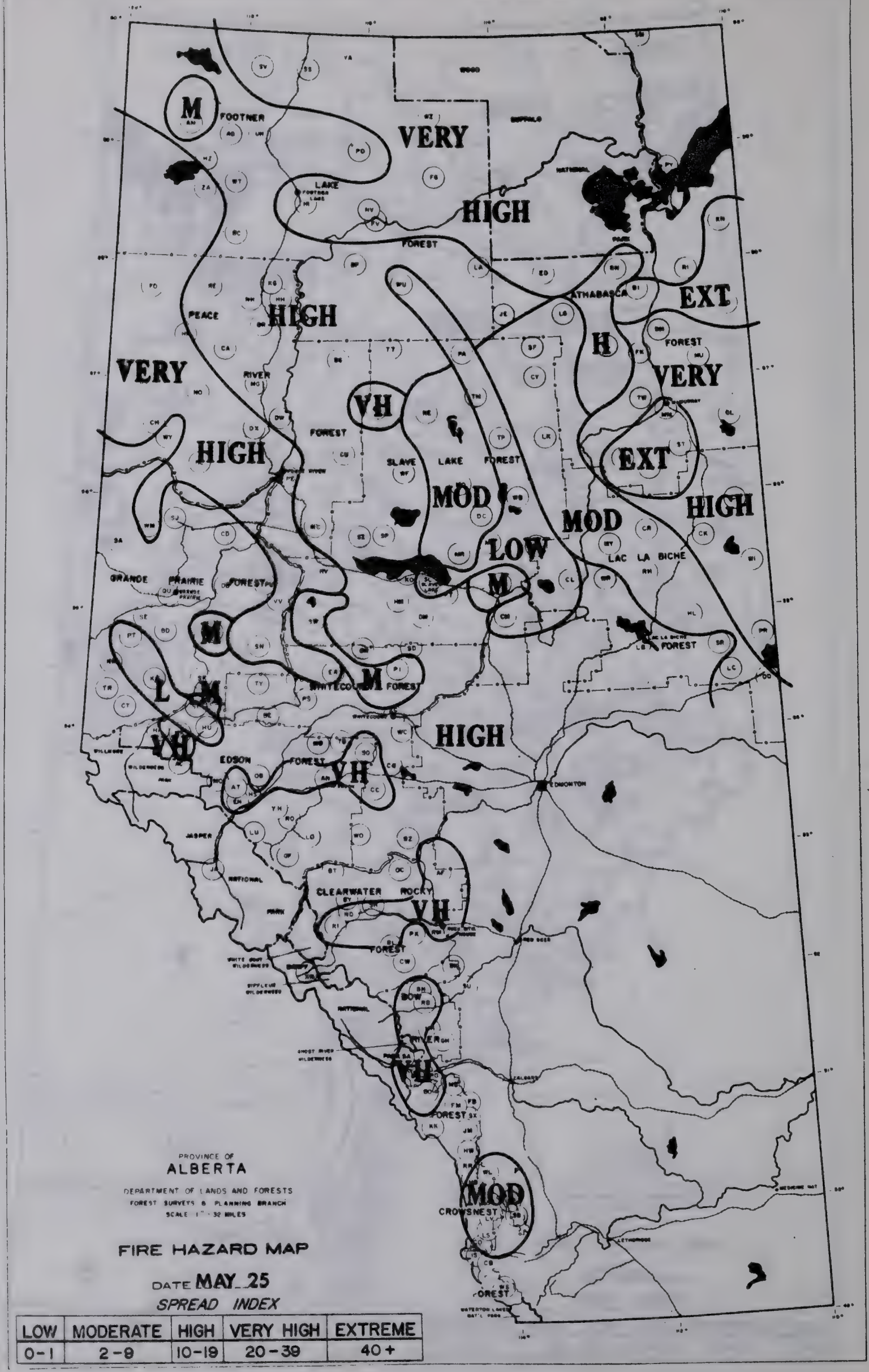
LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-1	2-9	10-19	20-39	40+


L
H
MODERATE
FOOTHILLS
FOREST
L
E
L
H
VERY
HIGH
EXT
H
FOREST
SLAVE
LAKE
FOREST
E
H
GRANDE
PRAIRIE
FOREST
MOD
HIGH
VH
H
LOW
EDSON
FOREST
WHITECOURT
FOREST
EXTREME
ATHABASCA
FOREST
LAC LA BICHE
FOREST
L
MOD
FOREST
VH
HIGH
L
M
LOW
FOREST
PROVINCE OF
ALBERTA
DEPARTMENT OF LANDS AND FORESTS
FOREST SURVEYS & PLANNING BRANCH
SCALE 1" = 32 MILES
FIRE HAZARD MAP
DATE MAY 22
SPREAD INDEX
LOW | MODERATE | HIGH | VERY HIGH | EXTREME
0-1 | 2-9 | 10-19 | 20-39 | 40+



LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-1	2-9	10-19	20-39	40+


M
FOOTNER LAKE
HIGH
FOREST
EXTREME
ATHABASCA
FOREST
PEACE
RIVER
VERY HIGH
E
H
FOREST
SLAVE LAKE FOREST
EXT
VH
H
H
LAC LA BICHE
GRANDE PRAIRIE FOREST
M
VH
WHITECOURT FOREST
VH
M
VH
VERY
EXTREME
EDSON FOREST
HIGH
HIGH
VH
VH
CLEARWATER
ROCKY
M
BOW
RIVER
M
FOREST
CROWS NEST
FOREST
EDMONTON
LAC LA BICHE FOREST
VH
PROVINCE OF
ALBERTA
DEPARTMENT OF LANDS AND FORESTS
FOREST SURVEYS & PLANNING BRANCH
SCALE 1" = 32 MILES
FIRE HAZARD MAP
DATE MAY 24
SPREAD INDEX
LOW
MODERATE
HIGH
VERY HIGH
EXTREME
0-1
2-9
10-19
20-39
40+



PROVINCE OF
ALBERTA

DEPARTMENT OF LANDS AND FORESTS
FOREST SURVEYS & PLANNING BRANCH
SCALE 1" - 32 MILES

FIRE HAZARD MAP

DATE MAY 25

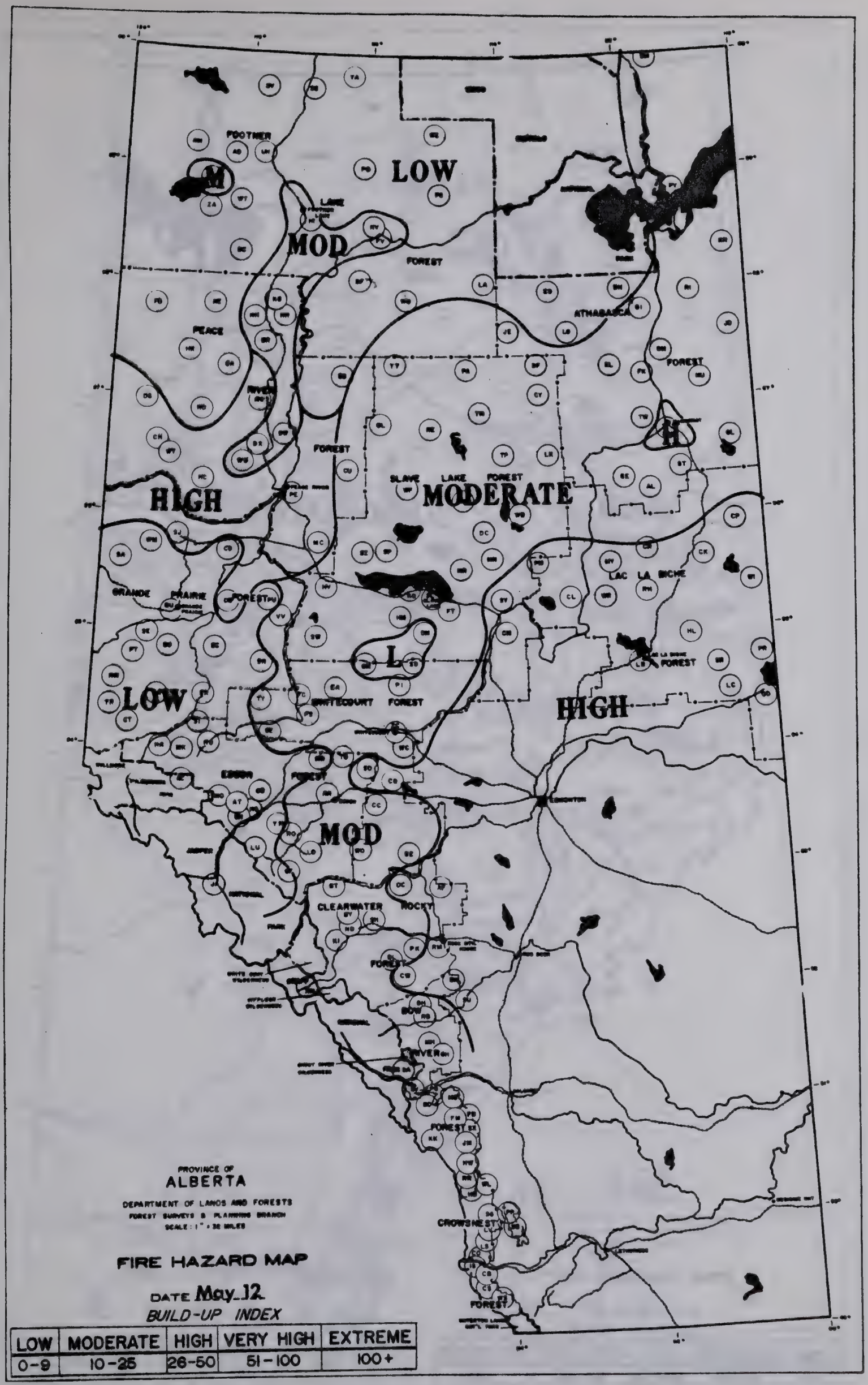
SPREAD INDEX

LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-1	2-9	10-19	20-39	40+

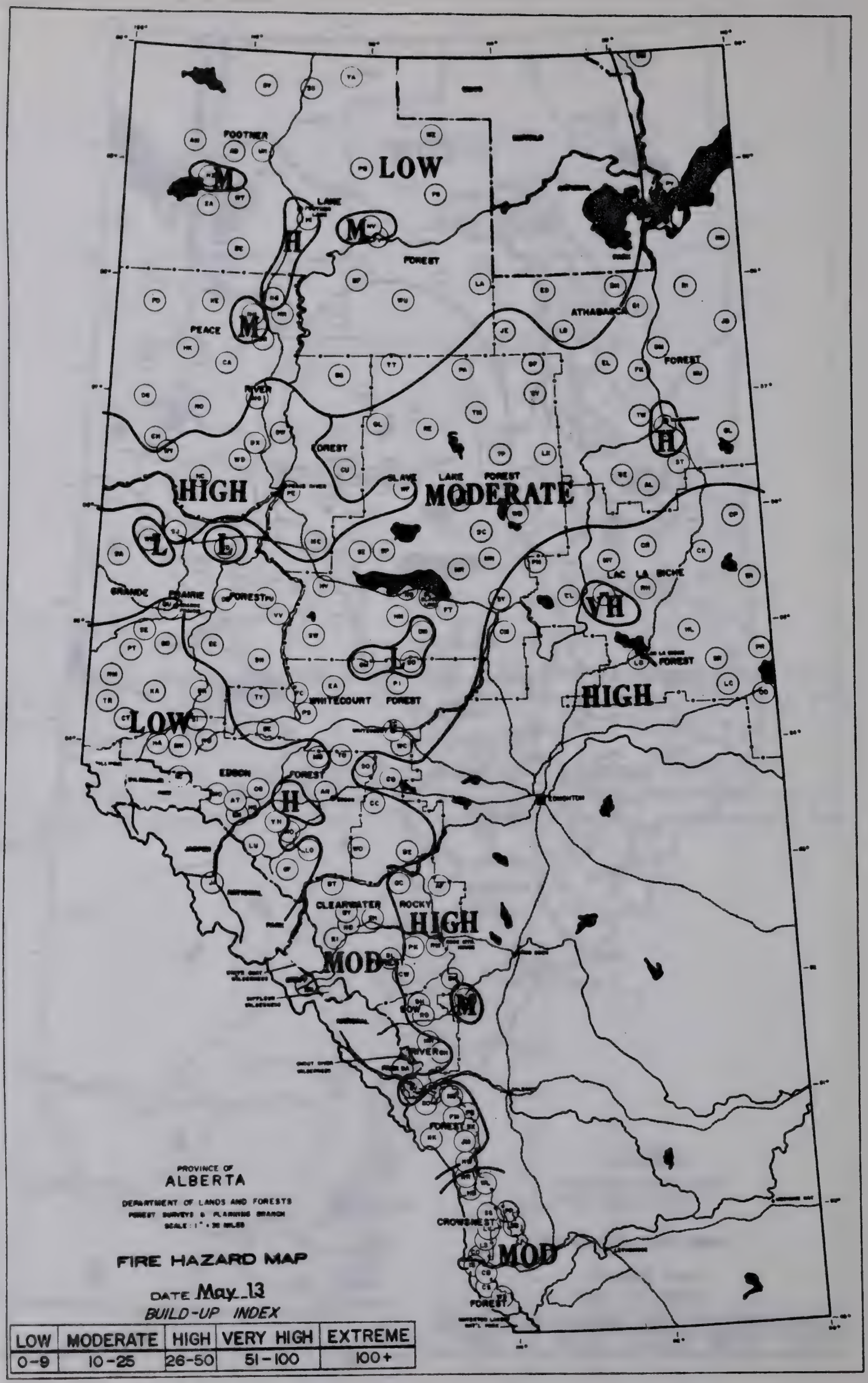
BUILDUP INDEX

These charts show the daily fire hazard for heavier forest fuels at all Forest Service weather stations throughout the Province, daily at 1:00 p.m.

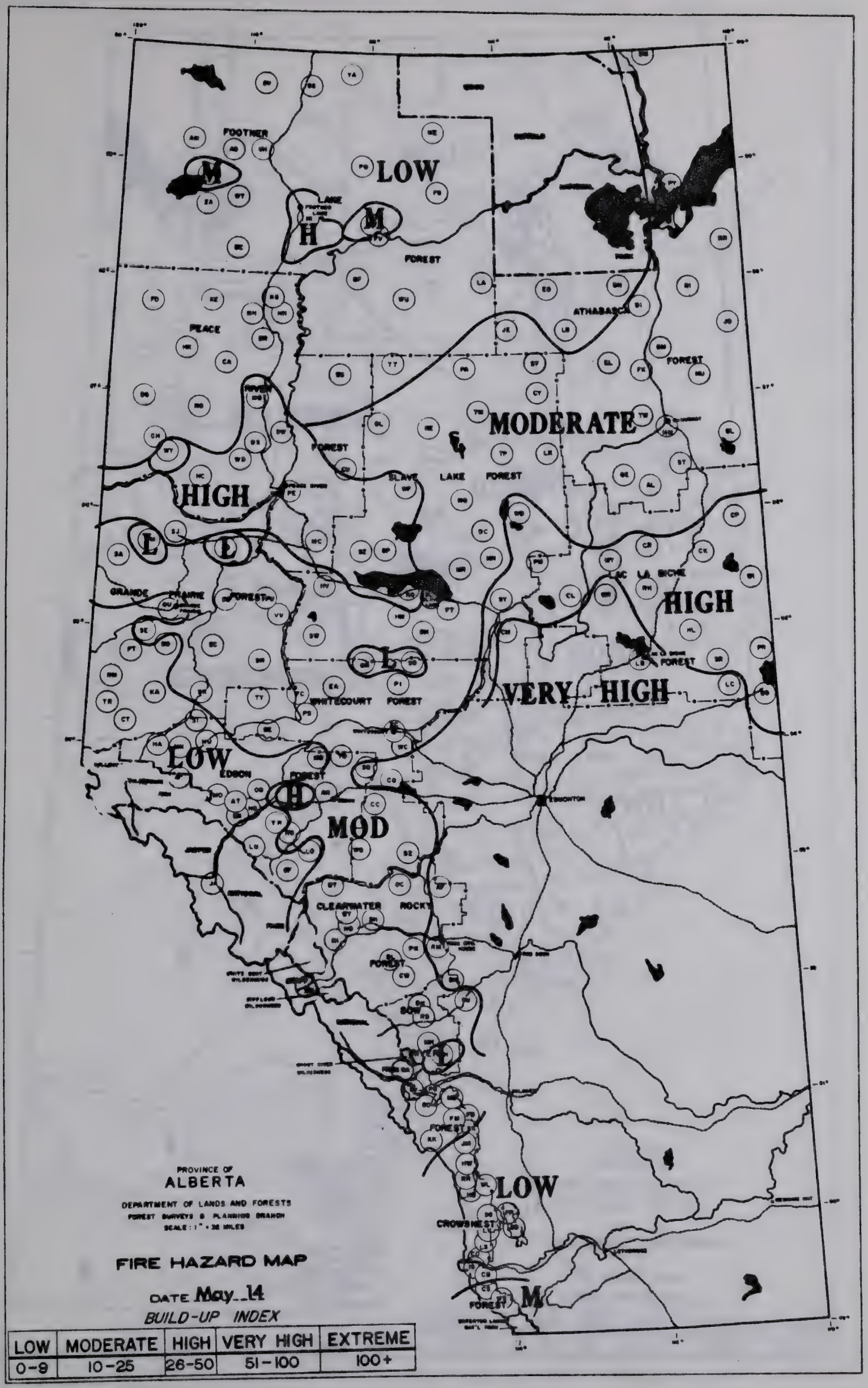
The Buildup Index measures the probable moisture content of slower drying forest fuels such as the top three to four inches of forest duff layer, or pieces of wood up to three or four inches in diameter, for example.



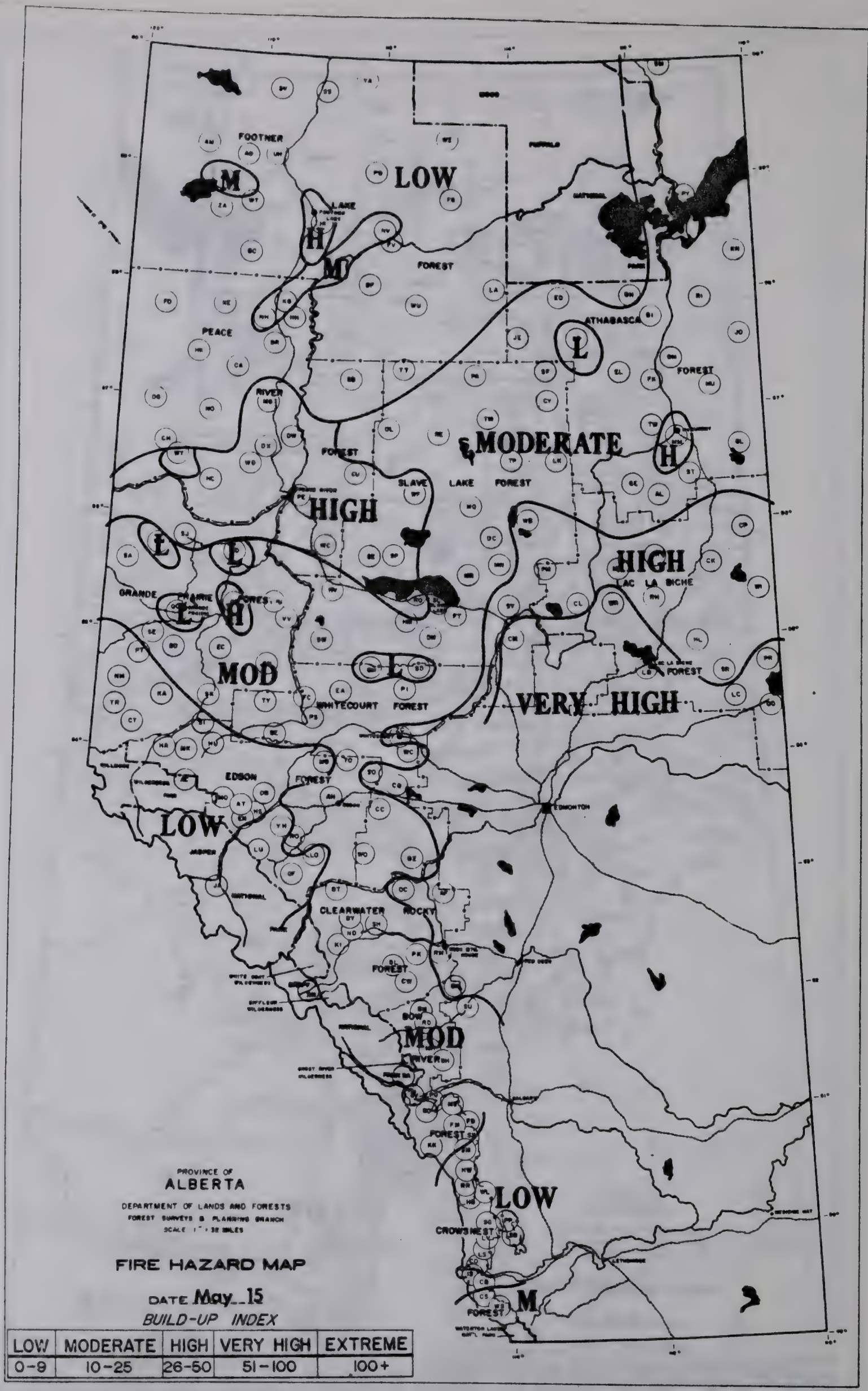
LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-9	10-25	26-50	51-100	100+



LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-9	10-25	26-50	51-100	100+



LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-9	10-25	26-50	51-100	100+



PROVINCE OF
ALBERTA

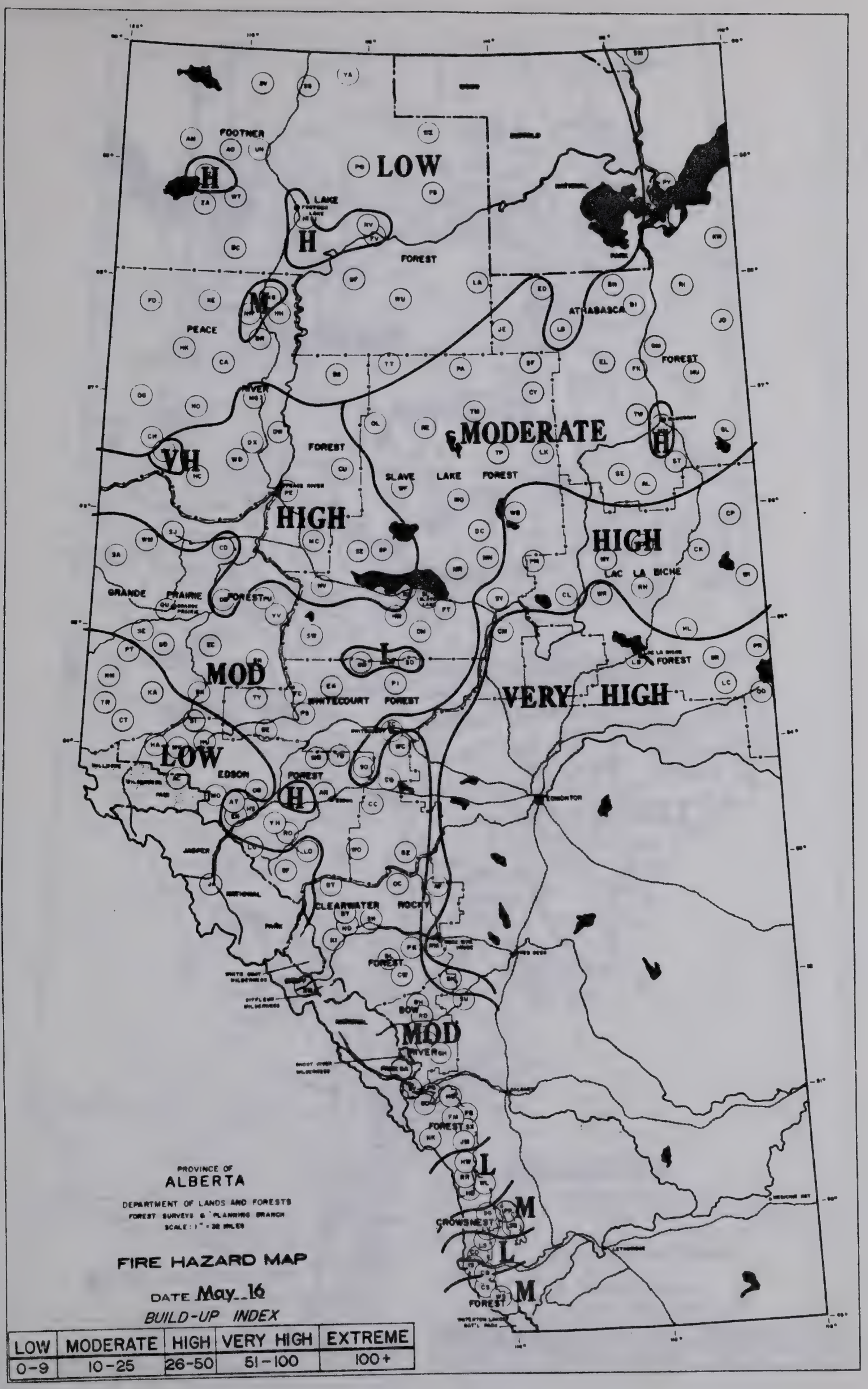
DEPARTMENT OF LANDS AND FORESTS
FOREST SURVEYS & PLANNING BRANCH
SCALE 1" = 32 MILES

FIRE HAZARD MAP

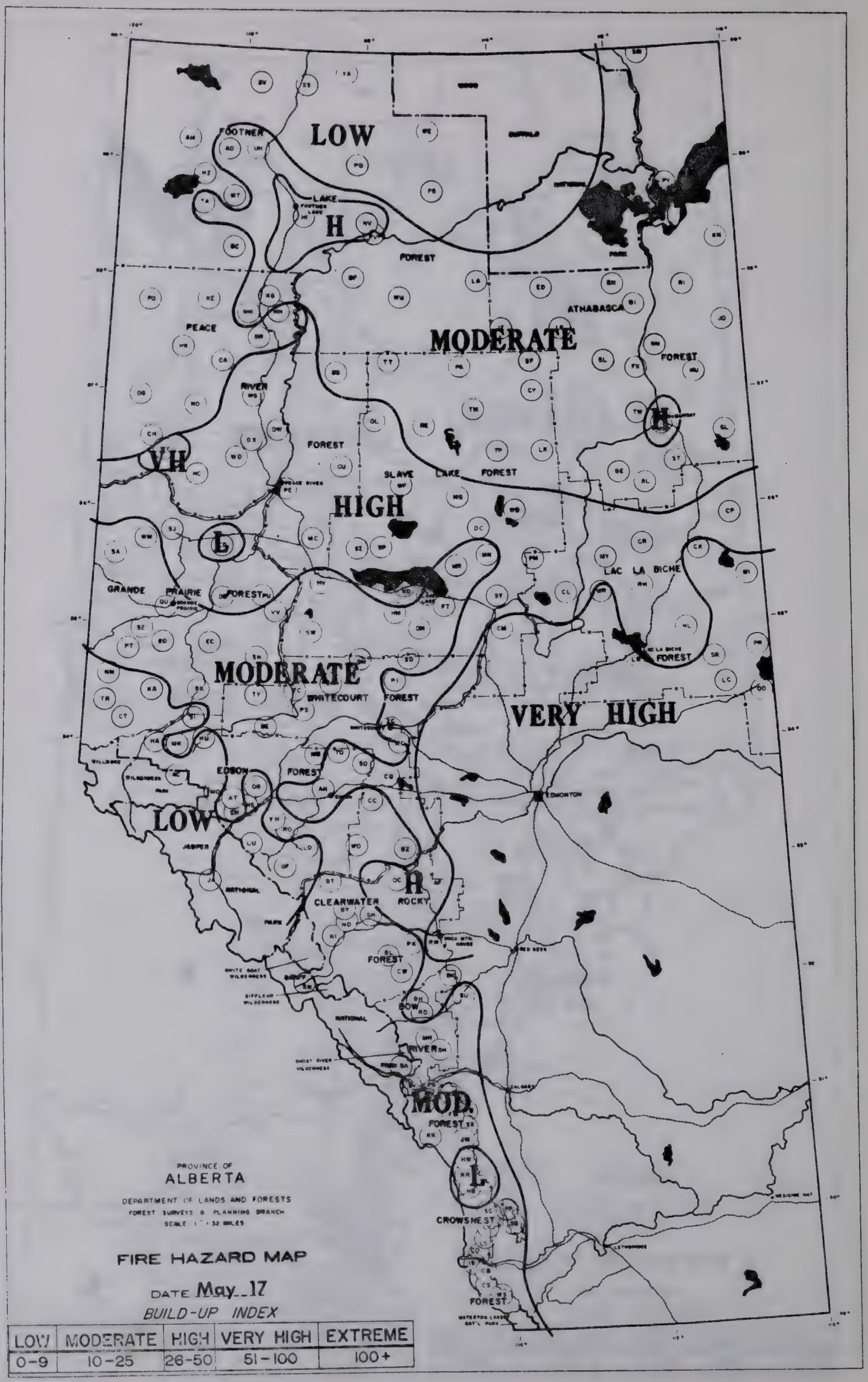
DATE May 15

BUILD-UP INDEX

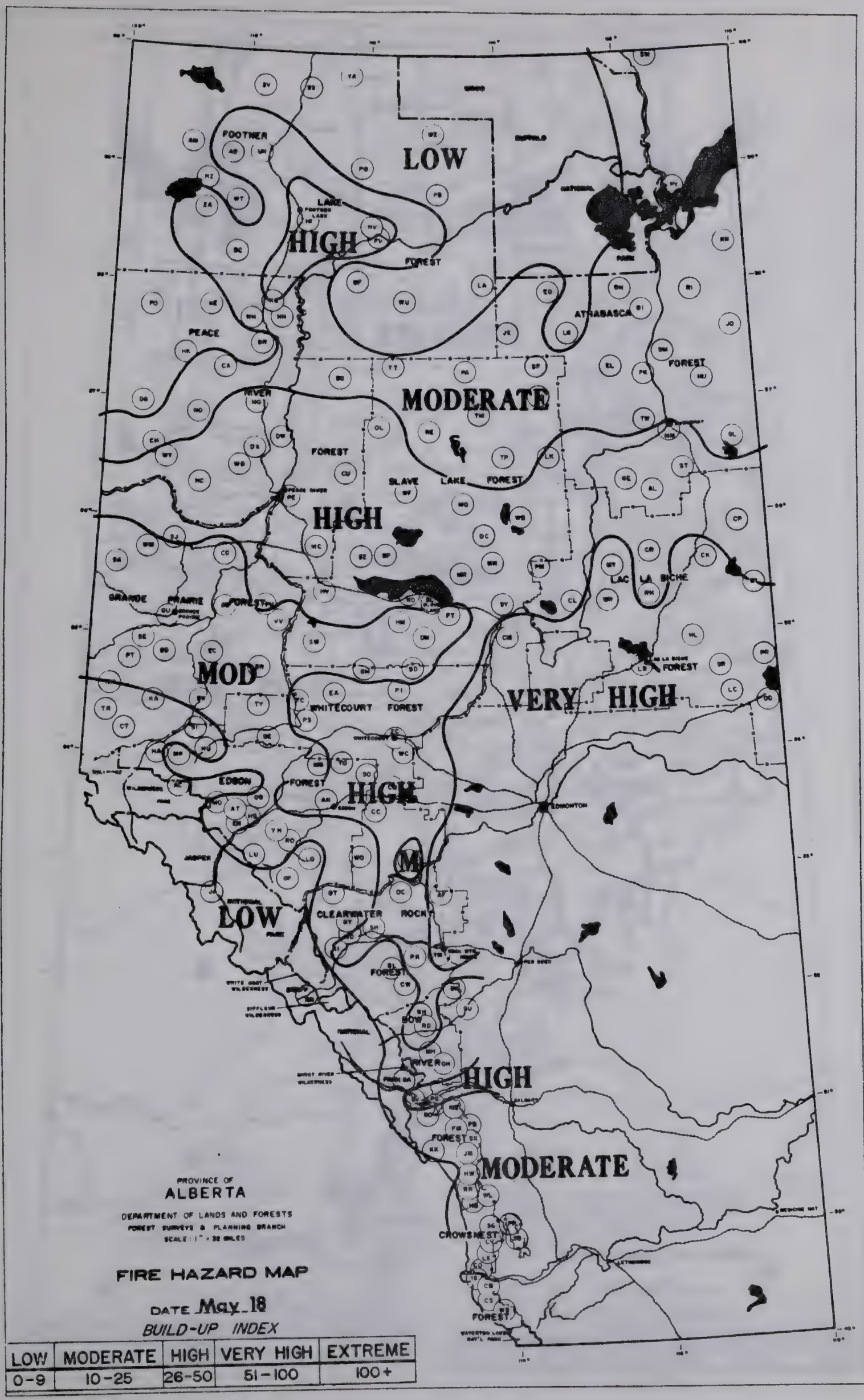
LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-9	10-25	26-50	51-100	100+



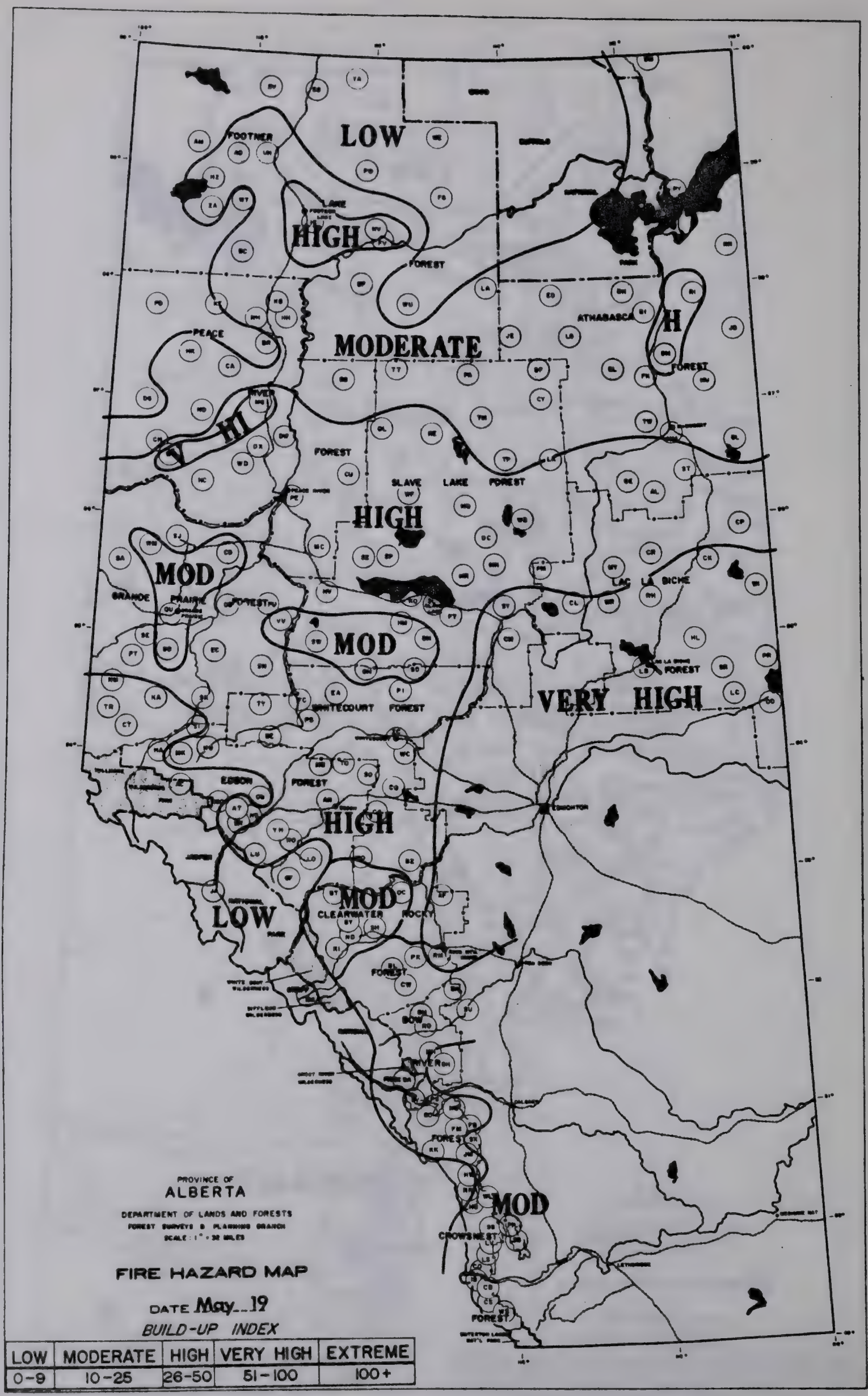
LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-9	10-25	26-50	51-100	100+



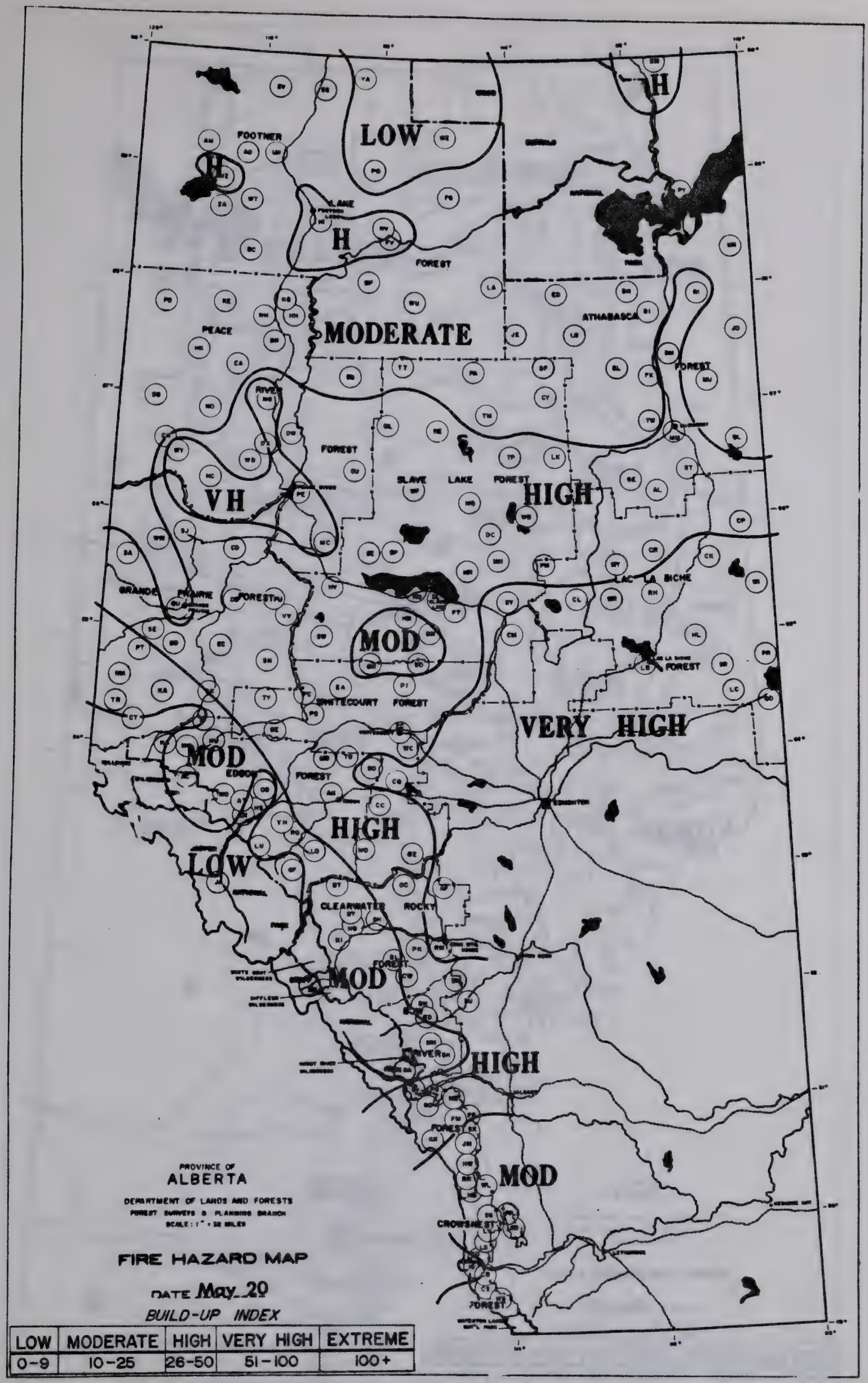
LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-9	10-25	26-50	51-100	100+



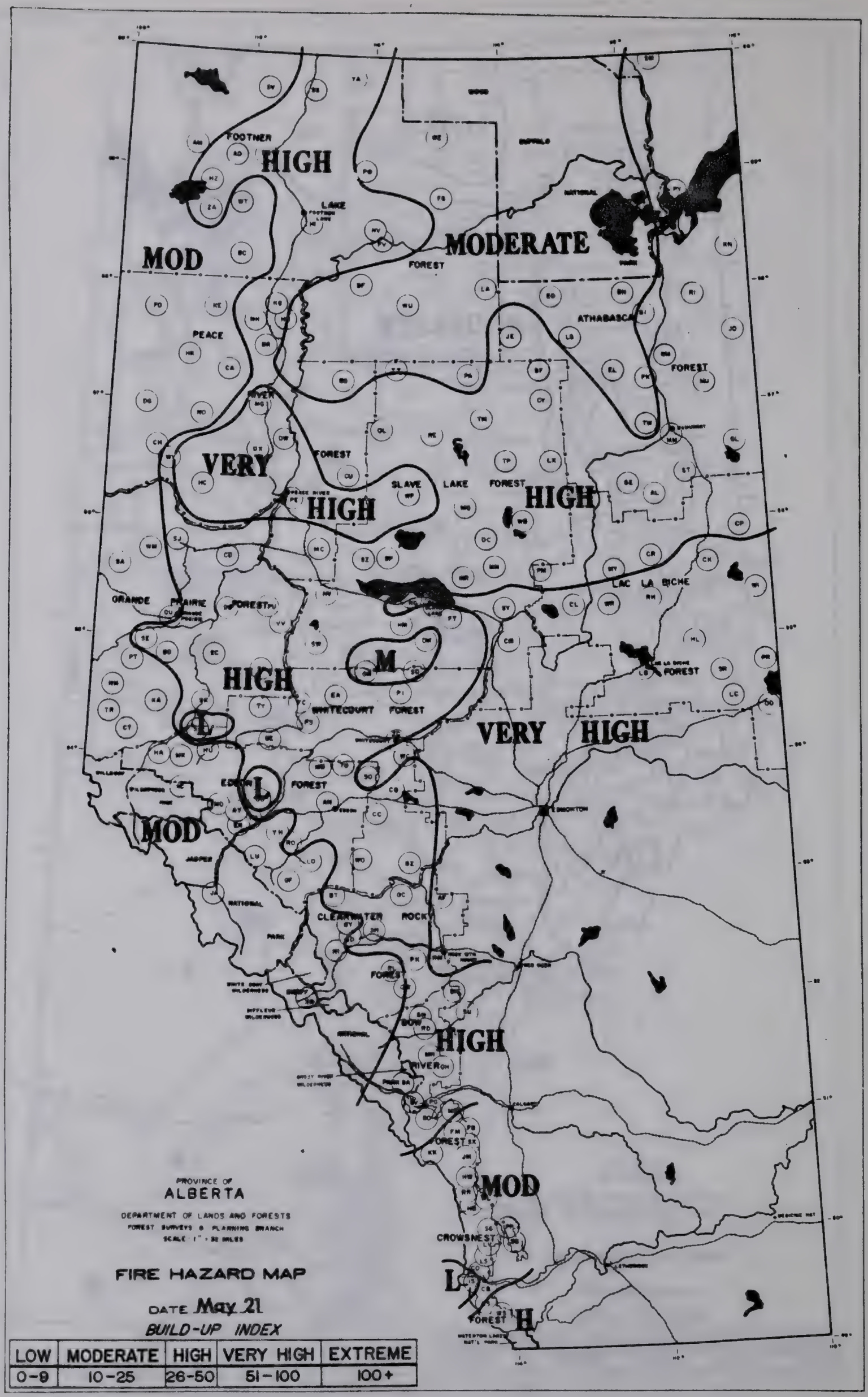
LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-9	10-25	26-50	51-100	100+



LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-9	10-25	26-50	51-100	100+



LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-9	10-25	26-50	51-100	100+



PROVINCE OF
ALBERTA

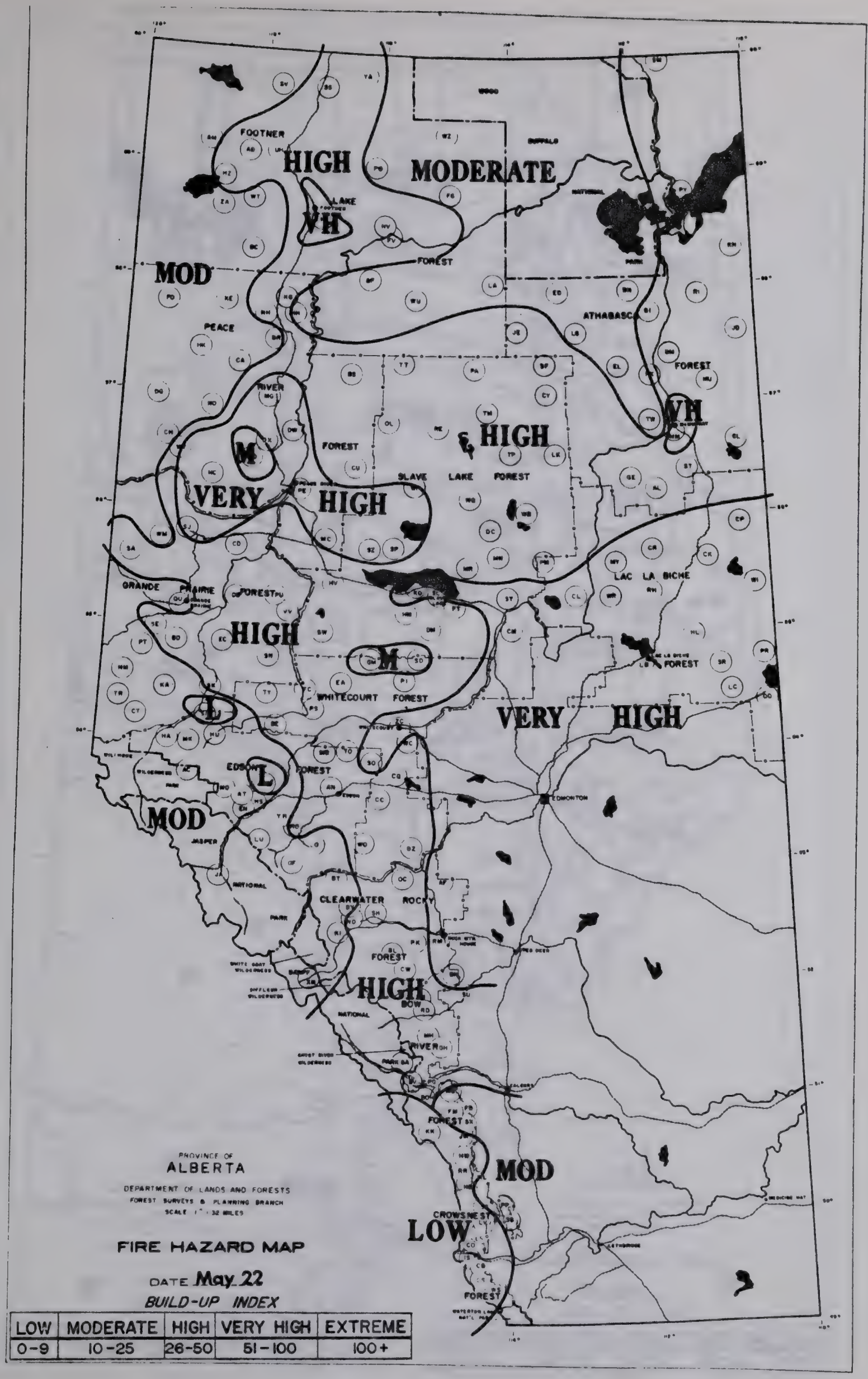
DEPARTMENT OF LANDS AND FORESTS
FOREST SURVEYS & PLANNING BRANCH
SCALE 1" = 32 MILES

FIRE HAZARD MAP

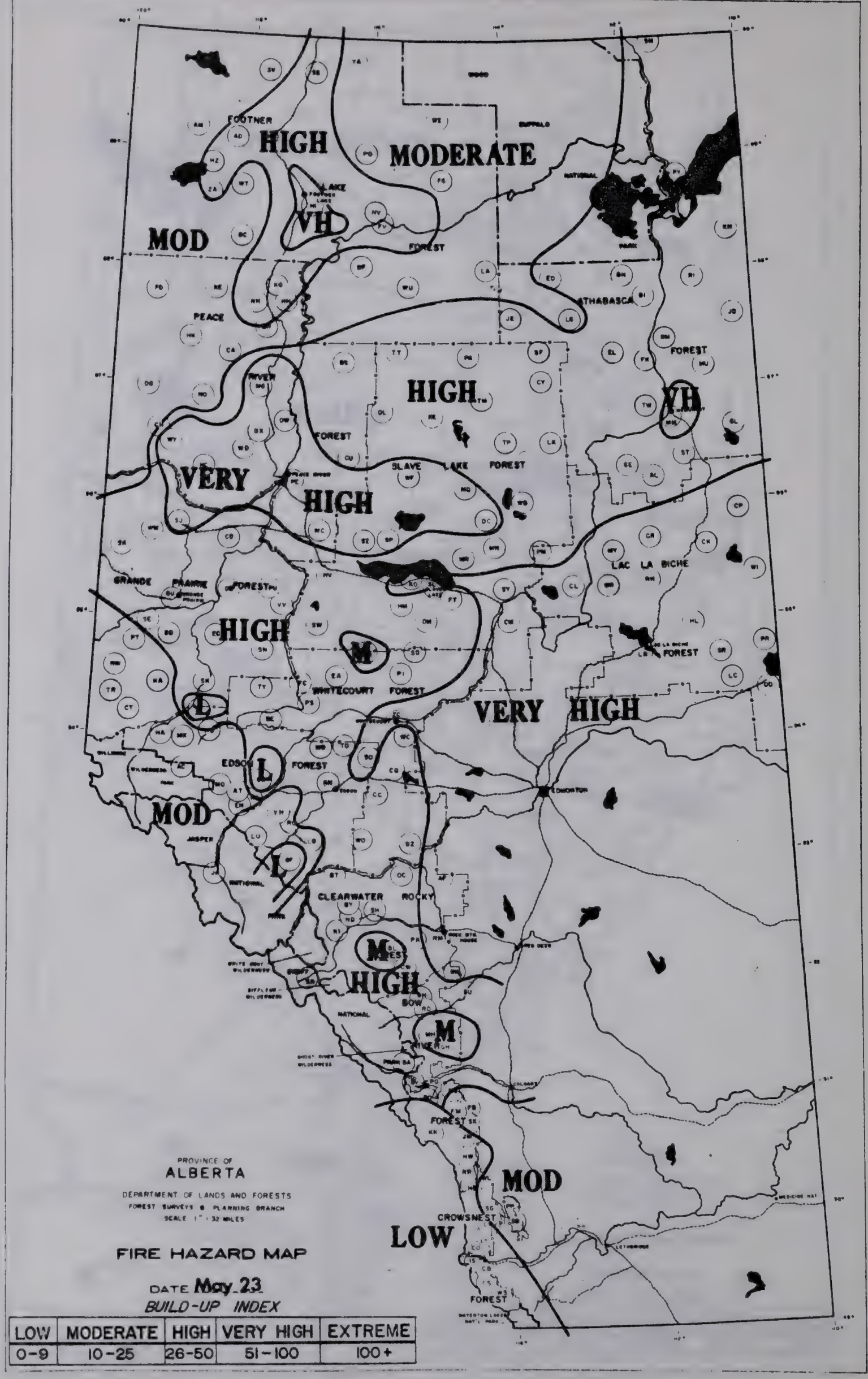
DATE May 21

BUILD-UP INDEX

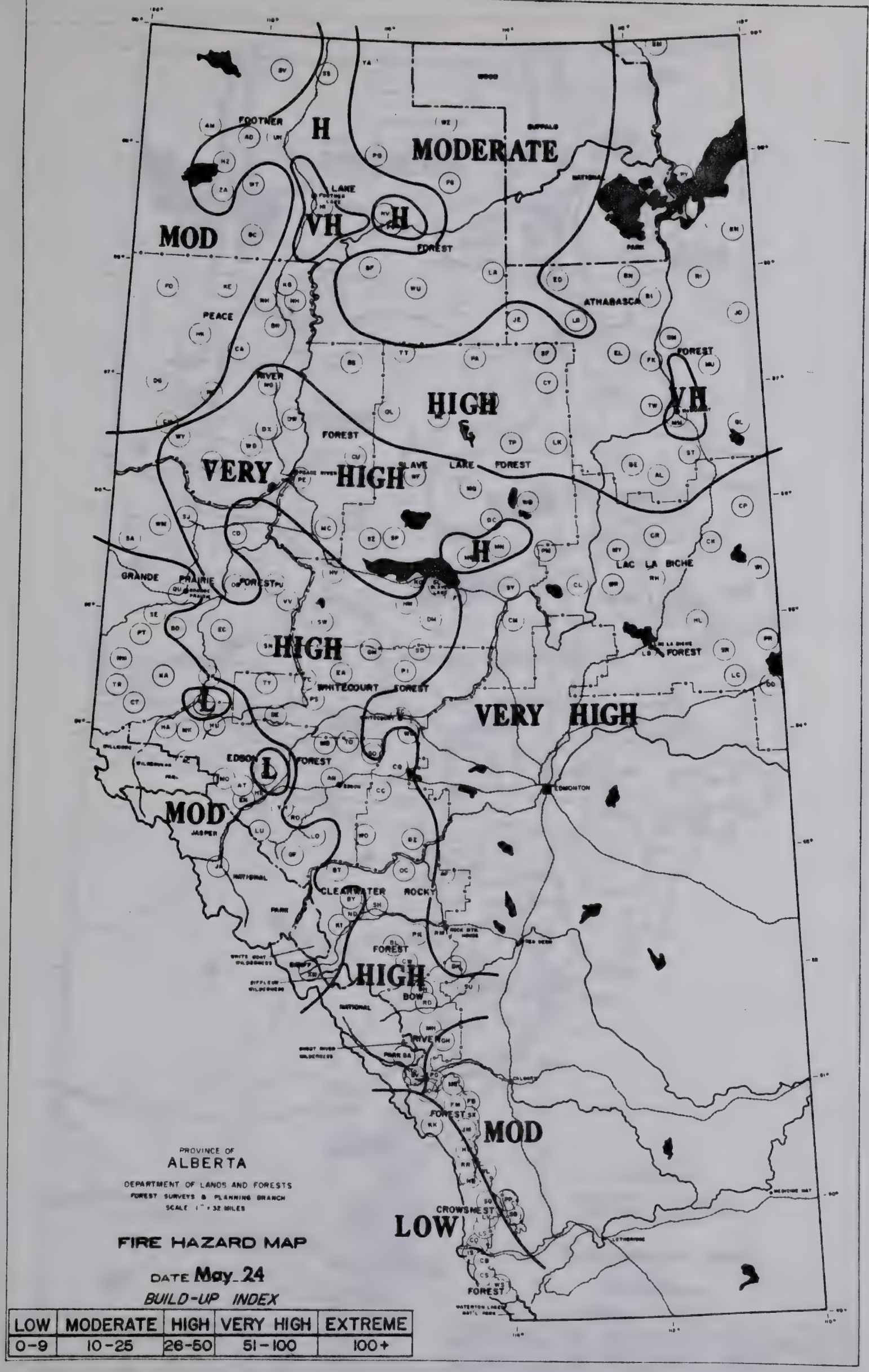
LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-9	10-25	26-50	51-100	100+



LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-9	10-25	26-50	51-100	100+



LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-9	10-25	26-50	51-100	100+



PROVINCE OF
ALBERTA

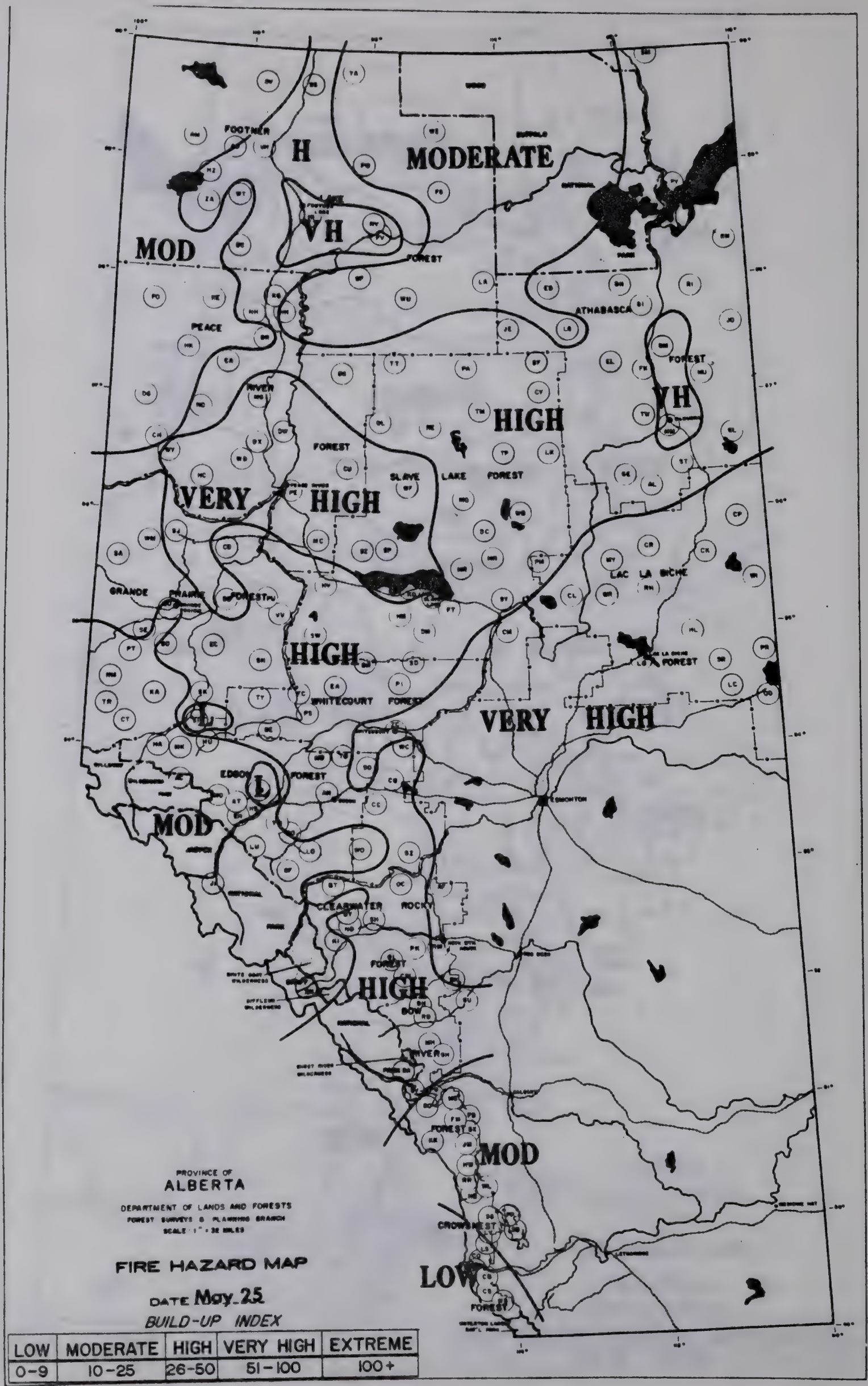
DEPARTMENT OF LANDS AND FORESTS
FOREST SURVEYS & PLANNING BRANCH
SCALE 1" = 32 MILES

FIRE HAZARD MAP

DATE May 24

BUILD-UP INDEX

LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-9	10-25	26-50	51-100	100+



LOW	MODERATE	HIGH	VERY HIGH	EXTREME
0-9	10-25	26-50	51-100	100+

SOIL MOISTURE INDEX

A graphical method of estimating the intensity of extended drought.

The Soil Moisture Index is calculated by a modified Thornthwaite[1] formula developed for gauging the soil-water balance. It is an attempt to measure drought severity as a supplement to the present method of estimating fire danger.[2]

An 800 point scale is used, indicating the soil has a capacity to hold eight inches of rain.

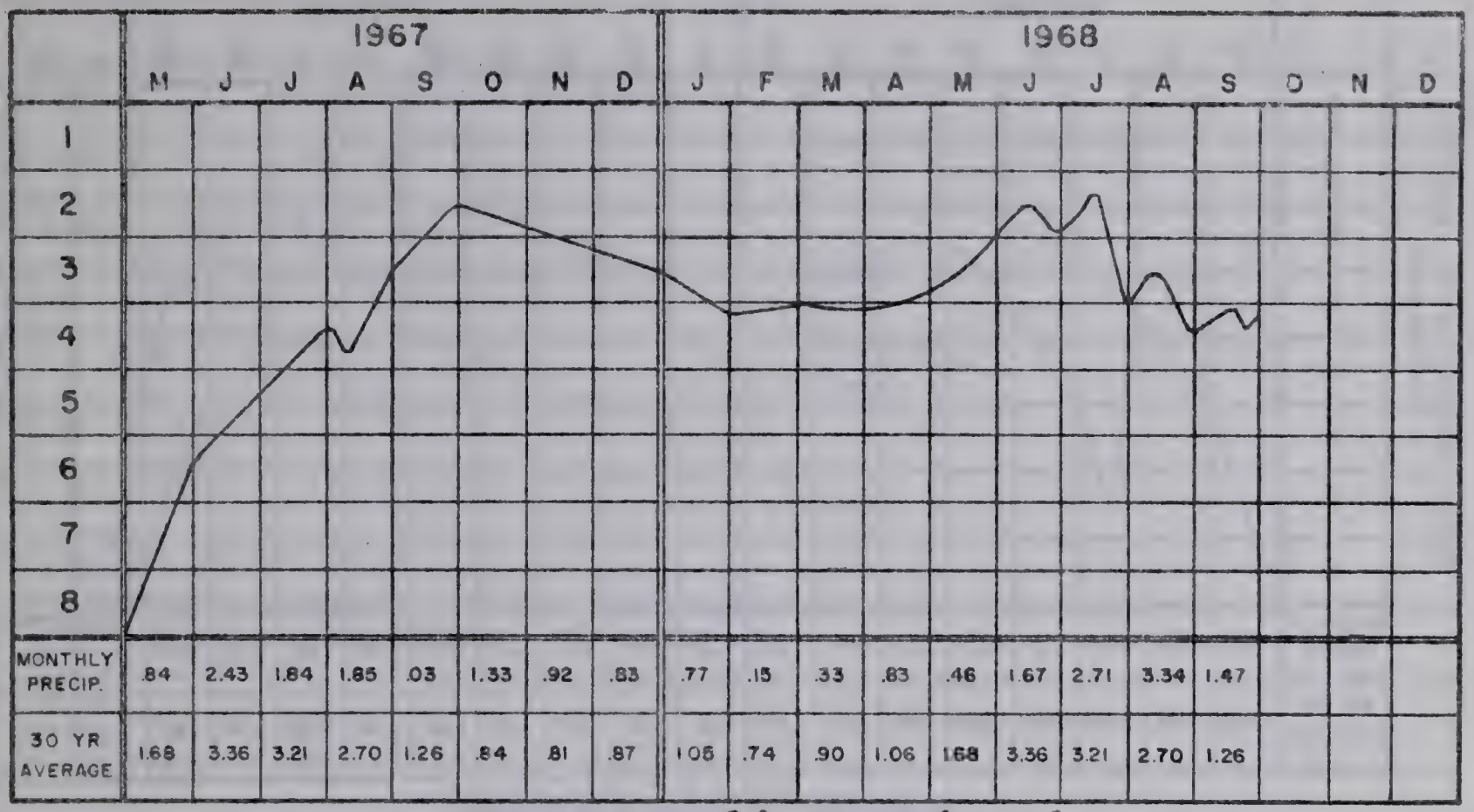
A few selected graphs are presented to show how the 1967 summer drought reduced the soil moisture level continuously until October 1967.

Literature Reference

(1) An approach toward a Rational Classification of Climate 1948
Thornthwaite, C.W.

(2) Drought Estimation in Southern Forest Fire Control 1959
Nelson, R.M.

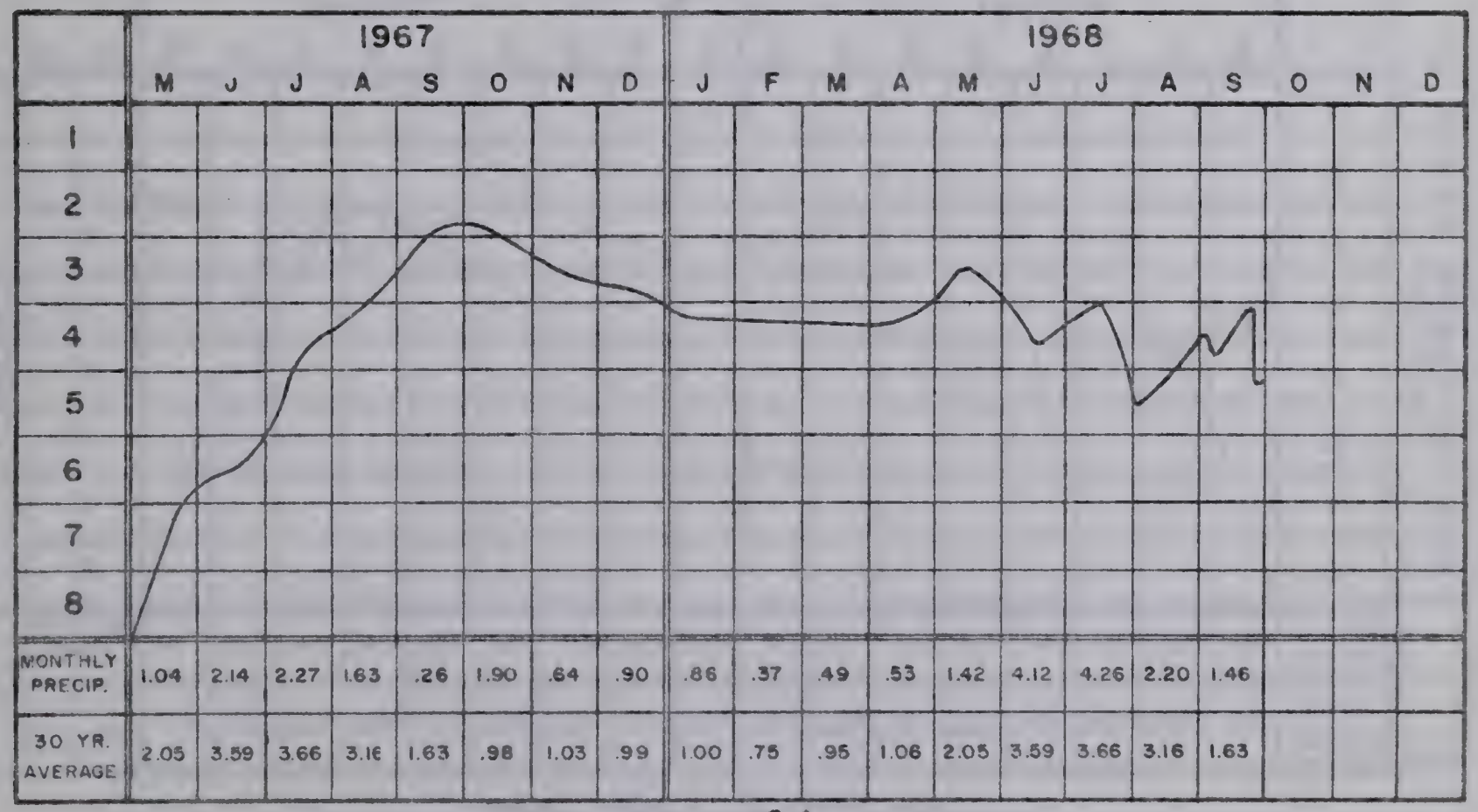
SOIL MOISTURE INDEX



	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MONTHLY PRECIP.	.84	2.43	1.84	1.85	.03	1.33	.92	.83	.77	.15	.33	.83	.46	1.67	2.71	3.34	1.47			
30 YR AVERAGE	1.68	3.36	3.21	2.70	1.26	.84	.81	.87	1.05	.74	.90	1.06	1.68	3.36	3.21	2.70	1.26			

STATION *Edmonton Int. Airport*

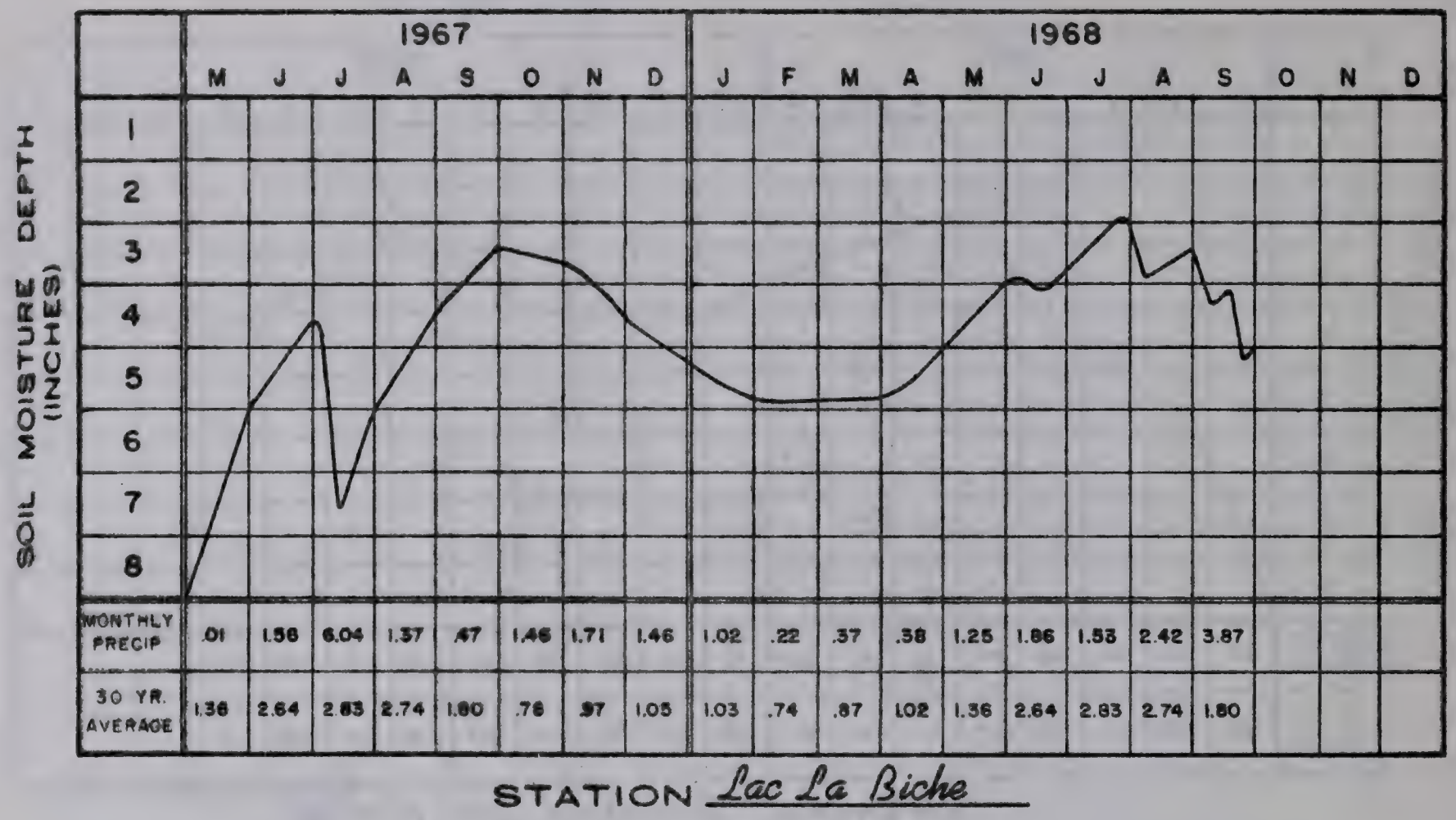
SOIL MOISTURE INDEX



	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MONTHLY PRECIP.	1.04	2.14	2.27	1.63	.26	1.90	.64	.90	.86	.37	.49	.53	1.42	4.12	4.26	2.20	1.46			
30 YR. AVERAGE	2.05	3.59	3.66	3.16	1.63	.98	1.03	.99	1.00	.75	.95	1.06	2.05	3.59	3.66	3.16	1.63			

STATION *Edson*

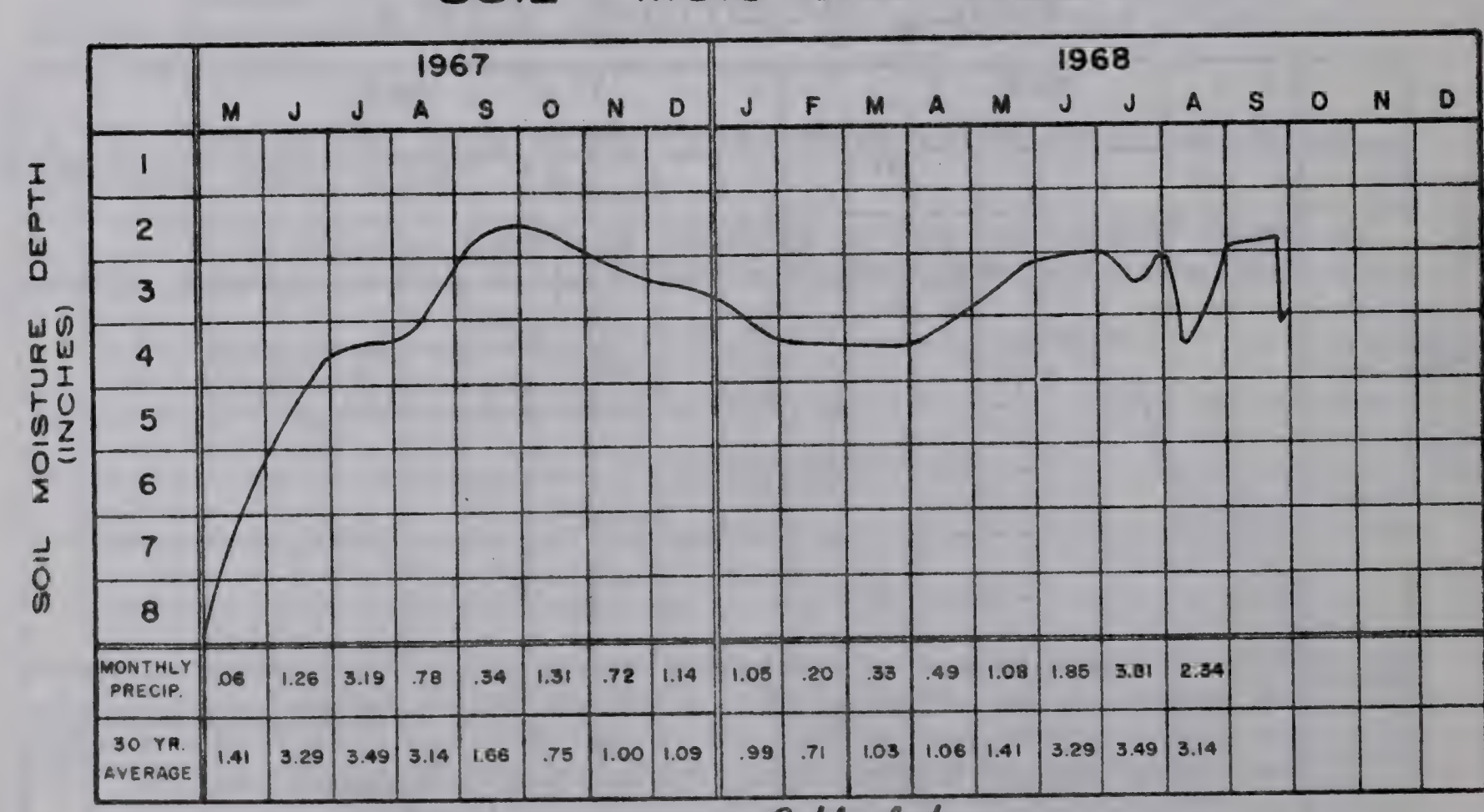
SOIL MOISTURE INDEX



	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MONTHLY PRECIP	.01	1.58	6.04	1.37	.47	1.46	1.71	1.46	1.02	.22	.37	.38	1.25	1.86	1.53	2.42	3.87			
30 YR. AVERAGE	1.36	2.64	2.83	2.74	1.80	.78	.97	1.05	1.03	.74	.87	1.02	1.36	2.64	2.83	2.74	1.80			

STATION *Lac La Biche*

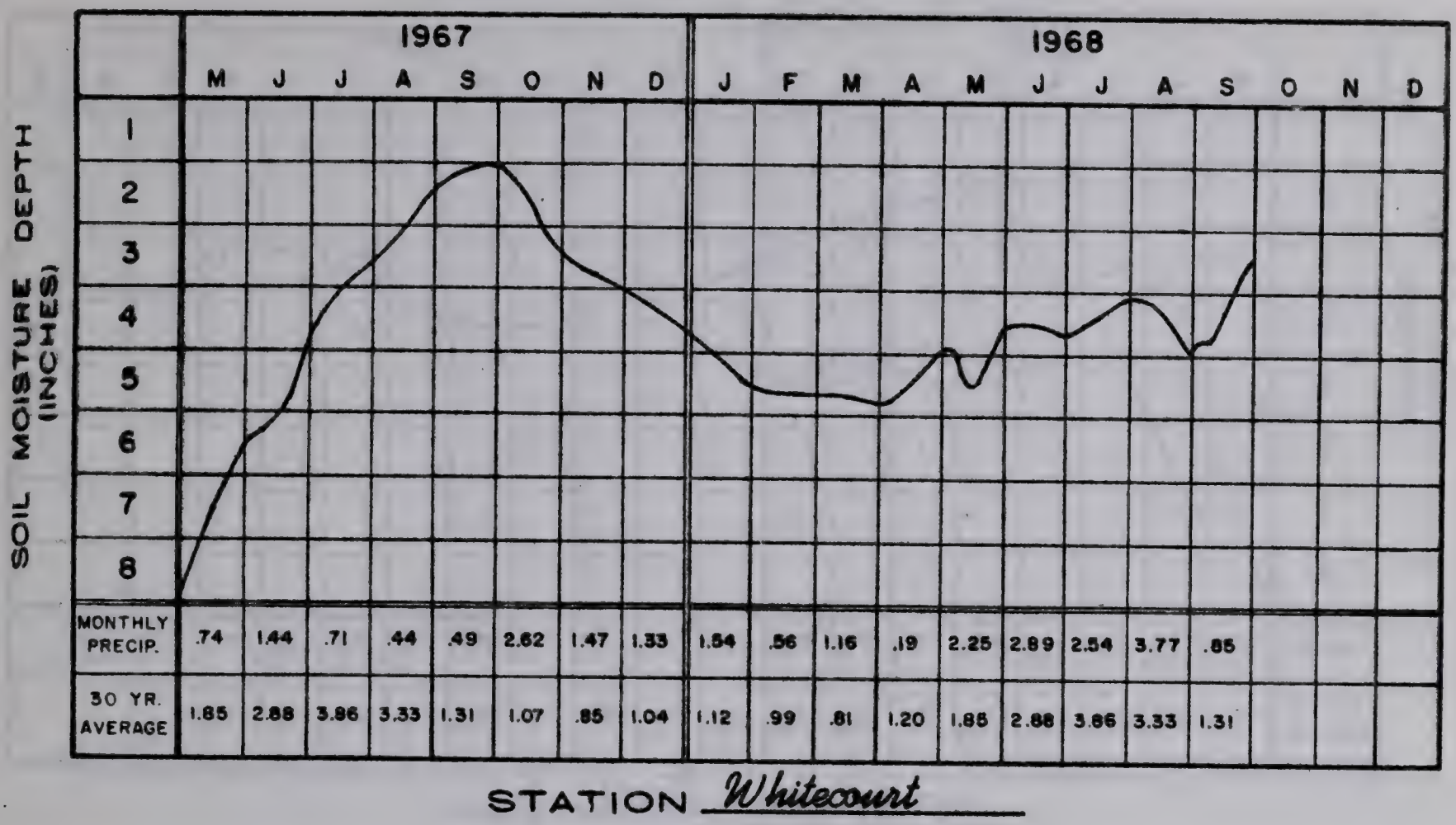
SOIL MOISTURE INDEX



	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MONTHLY PRECIP.	.06	1.26	3.19	.78	.34	1.31	.72	1.14	1.05	.20	.33	.49	1.08	1.85	3.81	2.34				
30 YR. AVERAGE	1.41	3.29	3.49	3.14	1.66	.75	1.00	1.09	.99	.71	1.03	1.06	1.41	3.29	3.49	3.14				

STATION *Cold Lake*

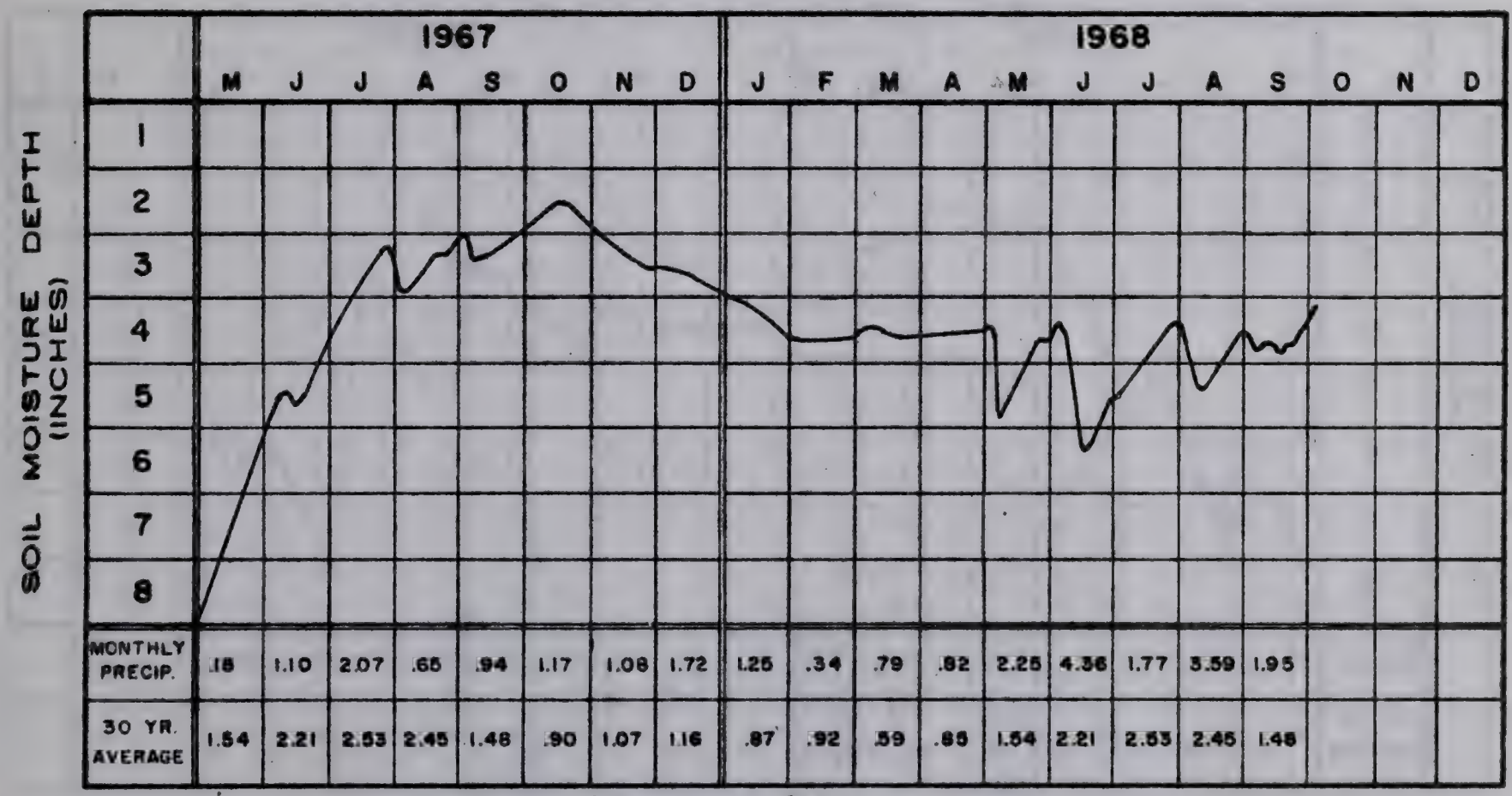
SOIL MOISTURE INDEX



	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MONTHLY PRECIP.	.74	1.44	.71	.44	.49	2.62	1.47	1.33	1.54	.56	1.16	.19	2.25	2.89	2.54	3.77	.85			
30 YR. AVERAGE	1.85	2.88	3.86	3.33	1.31	1.07	.85	1.04	1.12	.99	.81	1.20	1.85	2.88	3.86	3.33	1.31			

STATION *Whitecourt*

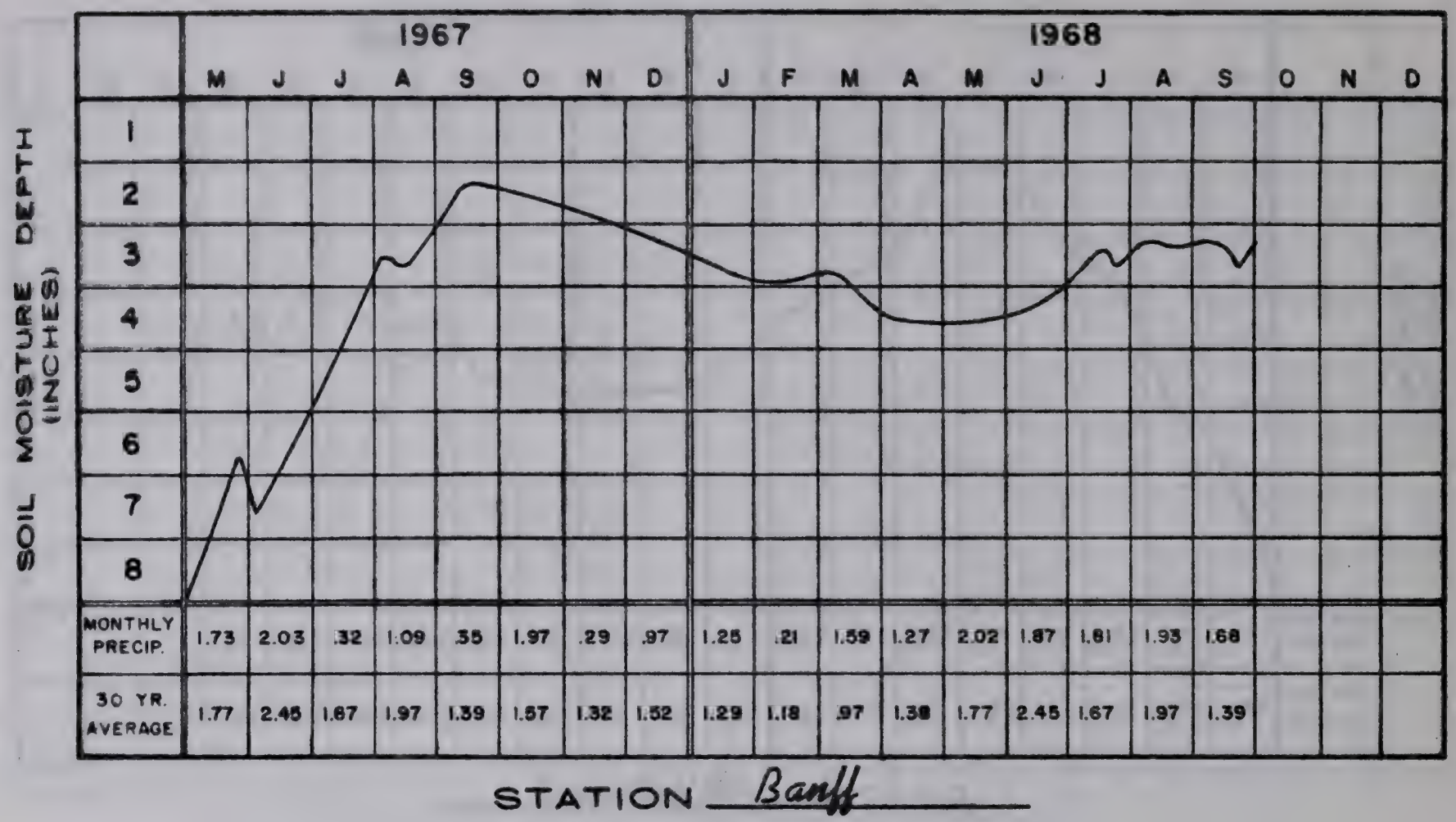
SOIL MOISTURE INDEX



	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MONTHLY PRECIP.	.18	1.10	2.07	.65	.94	1.17	1.08	1.72	1.25	.34	.79	.82	2.25	4.36	1.77	3.59	1.95			
30 YR. AVERAGE	1.54	2.21	2.53	2.45	1.48	.90	1.07	1.16	.87	.92	.59	.85	1.54	2.21	2.53	2.45	1.48			

STATION *Wagner*

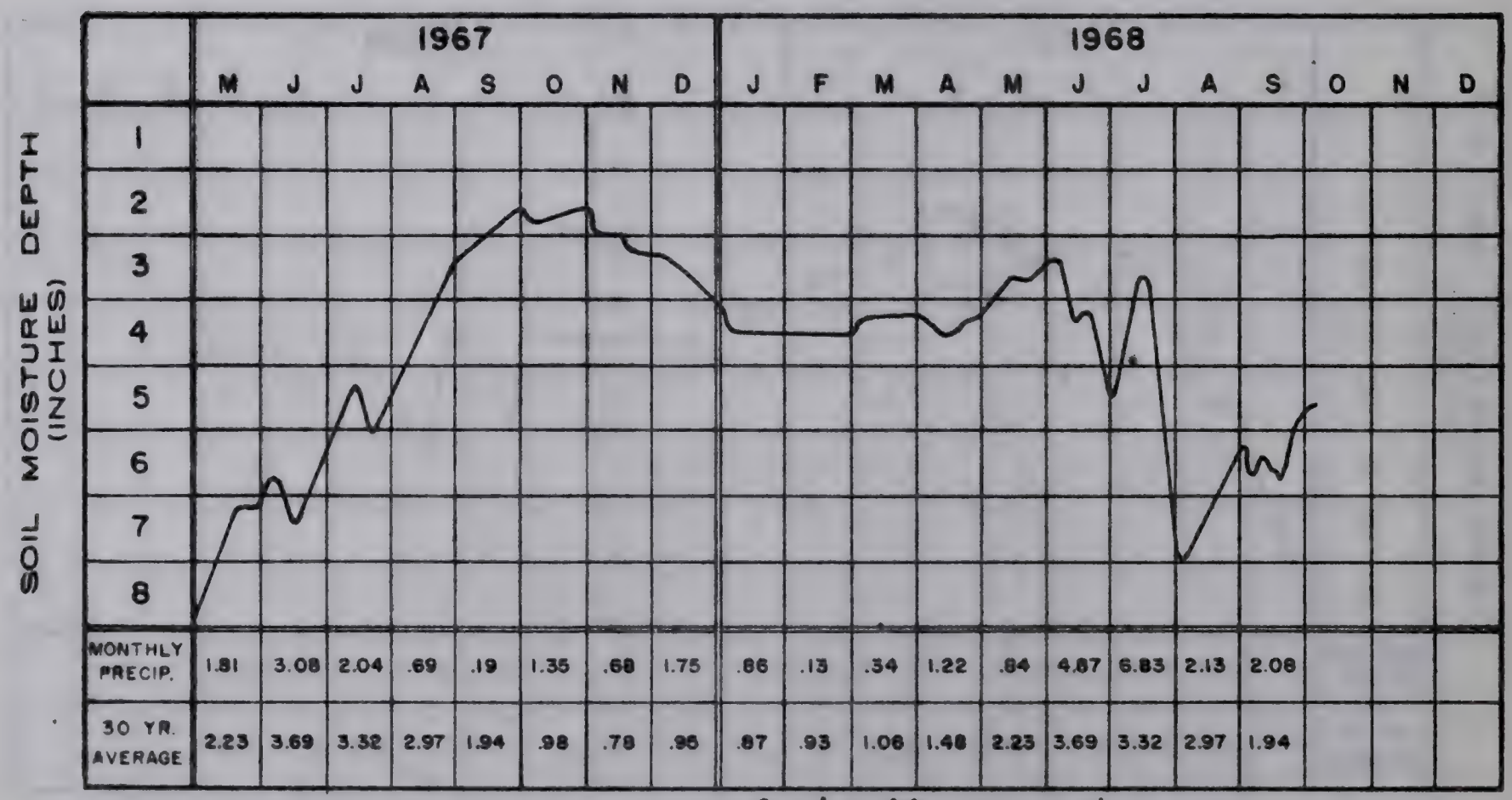
SOIL MOISTURE INDEX



	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MONTHLY PRECIP.	1.73	2.03	.32	1.09	.35	1.97	.29	.97	1.25	.21	1.59	1.27	2.02	1.87	1.81	1.93	1.68			
30 YR. AVERAGE	1.77	2.45	1.67	1.97	1.39	1.57	1.32	1.52	1.29	1.18	.97	1.38	1.77	2.45	1.67	1.97	1.39			

STATION Banff

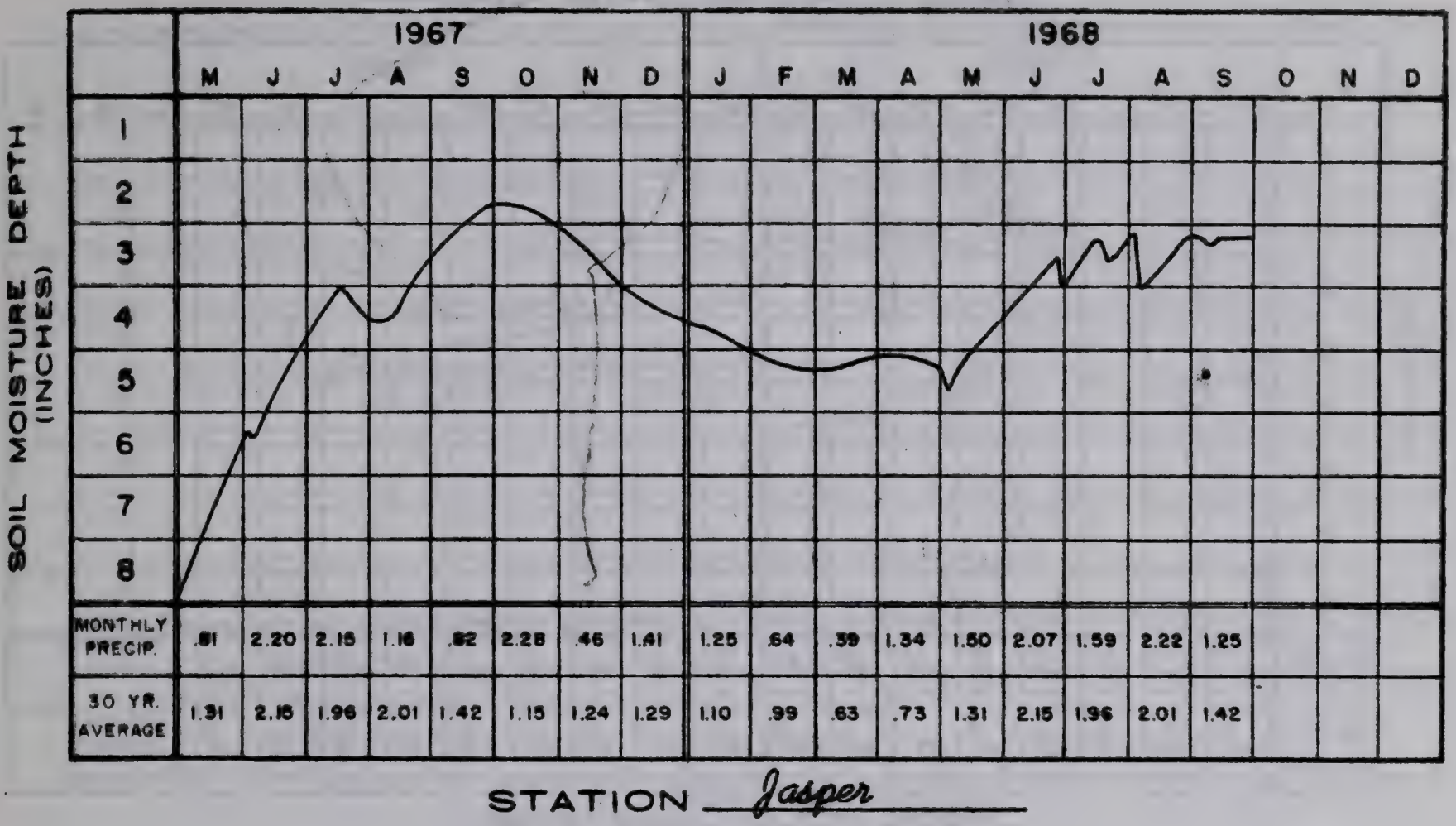
SOIL MOISTURE INDEX



	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MONTHLY PRECIP.	1.81	3.08	2.04	.69	.19	1.35	.68	1.75	.86	.13	.34	1.22	.84	4.87	6.83	2.13	2.08			
30 YR. AVERAGE	2.23	3.69	3.32	2.97	1.94	.98	.78	.96	.87	.93	1.08	1.48	2.23	3.69	3.32	2.97	1.94			

STATION Rocky Mountain House

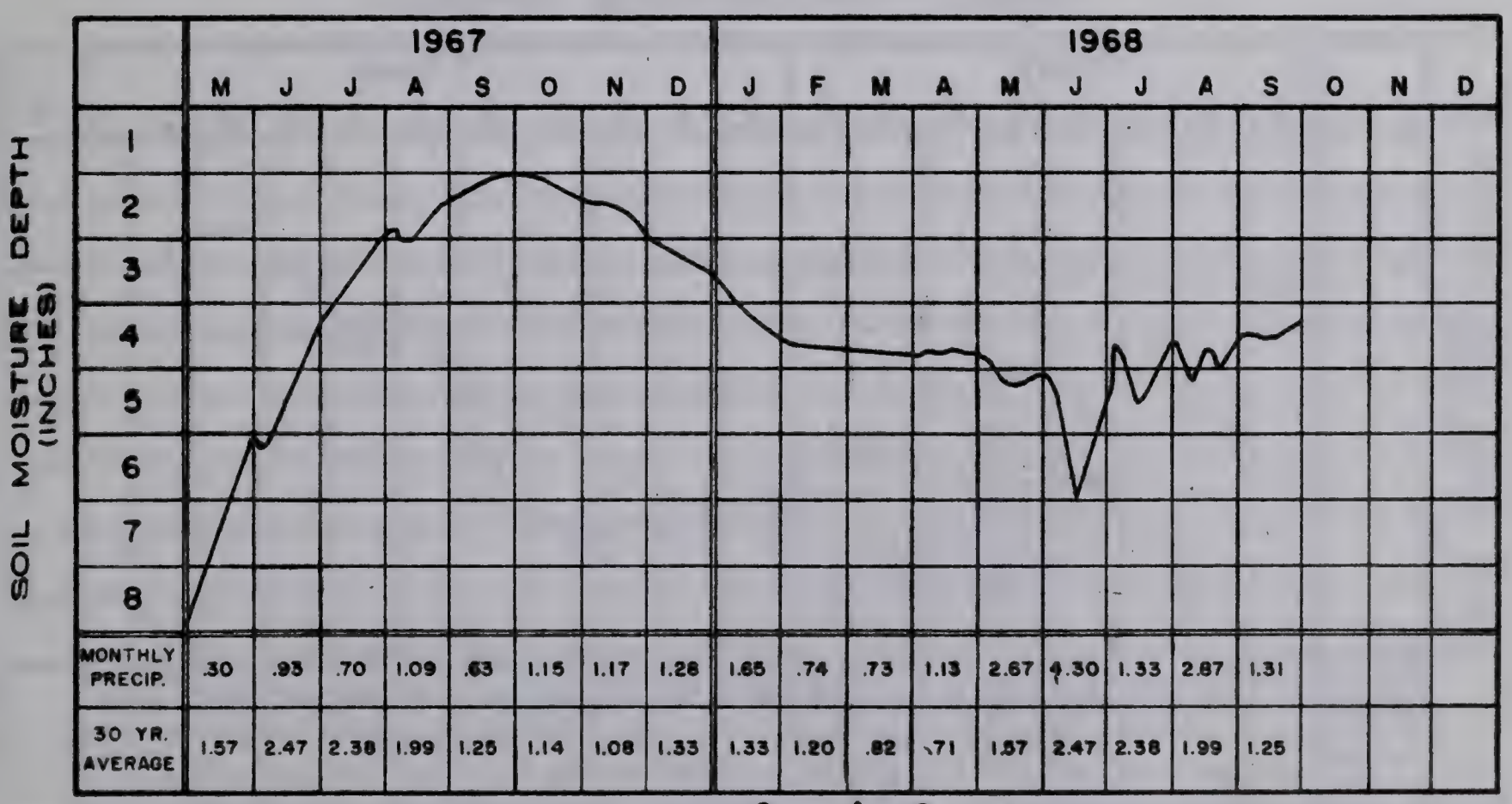
SOIL MOISTURE INDEX



	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MONTHLY PRECIP.	.81	2.20	2.15	1.16	.82	2.28	.46	1.41	1.25	.64	.39	1.34	1.50	2.07	1.59	2.22	1.25			
30 YR. AVERAGE	1.31	2.18	1.96	2.01	1.42	1.15	1.24	1.29	1.10	.99	.63	.73	1.31	2.15	1.96	2.01	1.42			

STATION Jasper

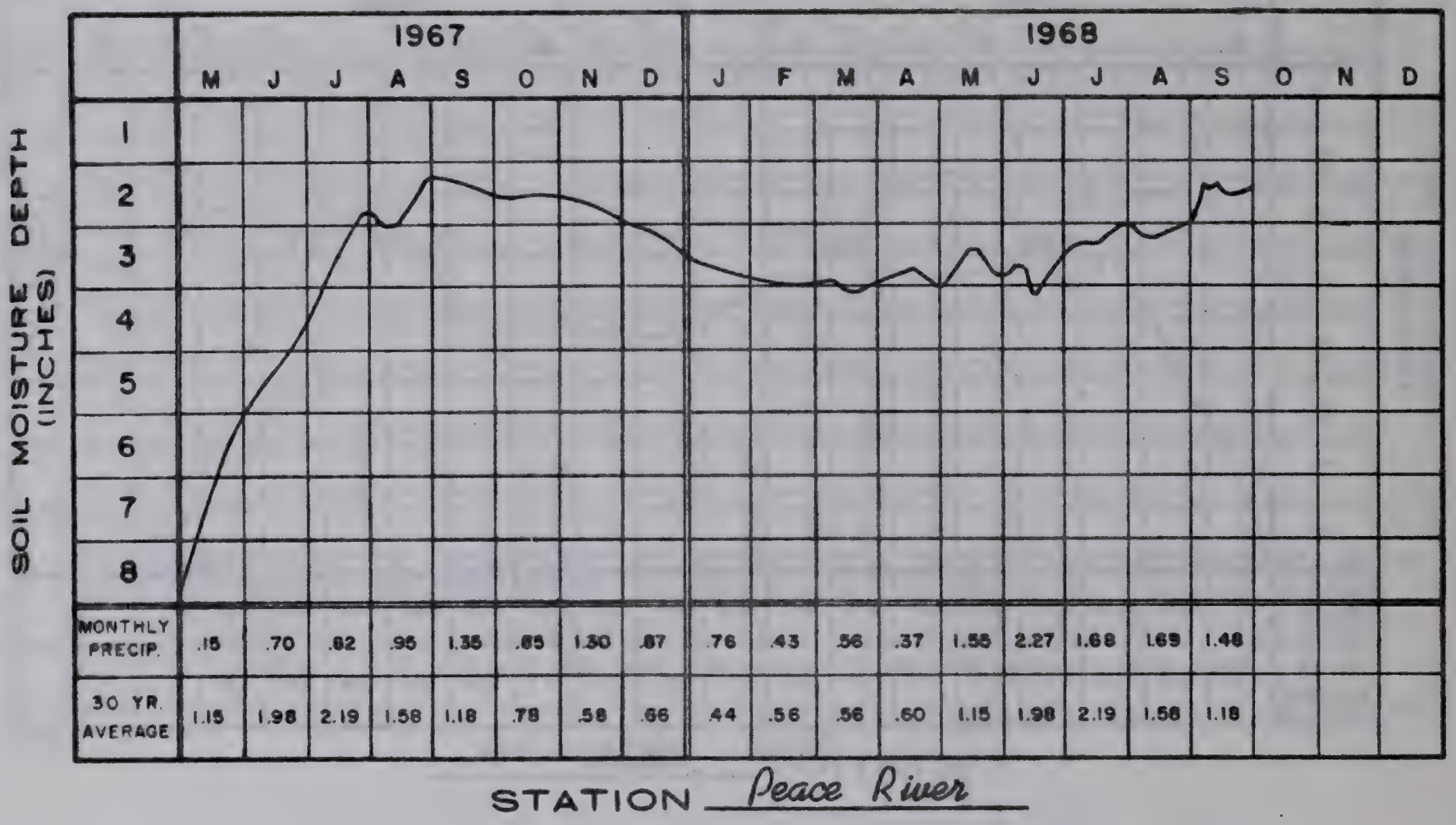
SOIL MOISTURE INDEX



	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MONTHLY PRECIP.	.30	.93	.70	1.09	.63	1.15	1.17	1.28	1.65	.74	.73	1.13	2.67	4.30	1.33	2.87	1.31			
30 YR. AVERAGE	1.57	2.47	2.38	1.99	1.25	1.14	1.08	1.33	1.33	1.20	.82	.71	1.57	2.47	2.38	1.99	1.25			

STATION Grande Prairie

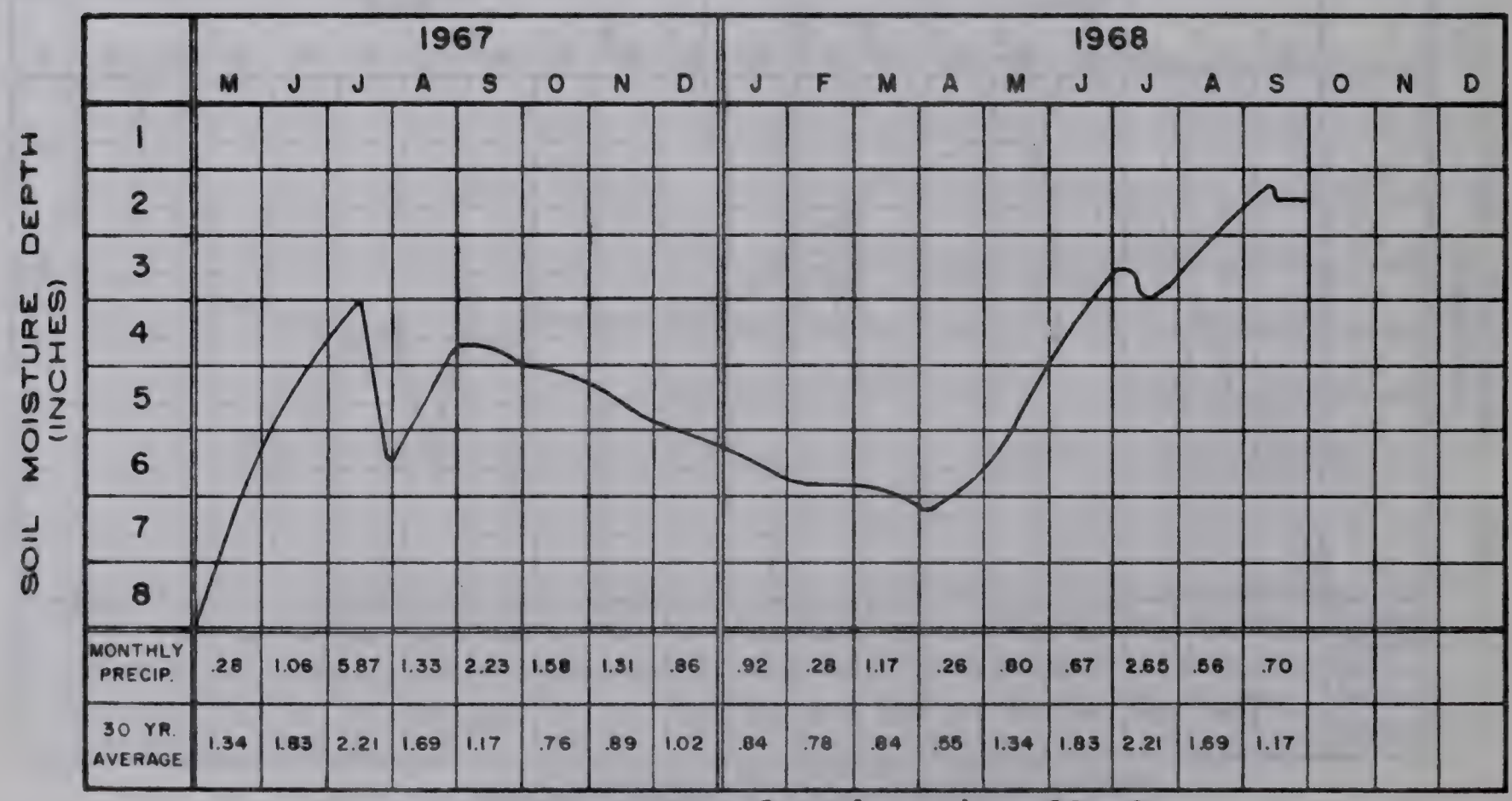
SOIL MOISTURE INDEX



	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MONTHLY PRECIP.	.15	.70	.82	.95	1.35	.65	1.30	.87	.76	.43	.56	.37	1.55	2.27	1.68	1.69	1.48			
30 YR. AVERAGE	1.15	1.98	2.19	1.58	1.18	.78	.58	.66	.44	.56	.56	.60	1.15	1.98	2.19	1.58	1.18			

STATION *Peace River*

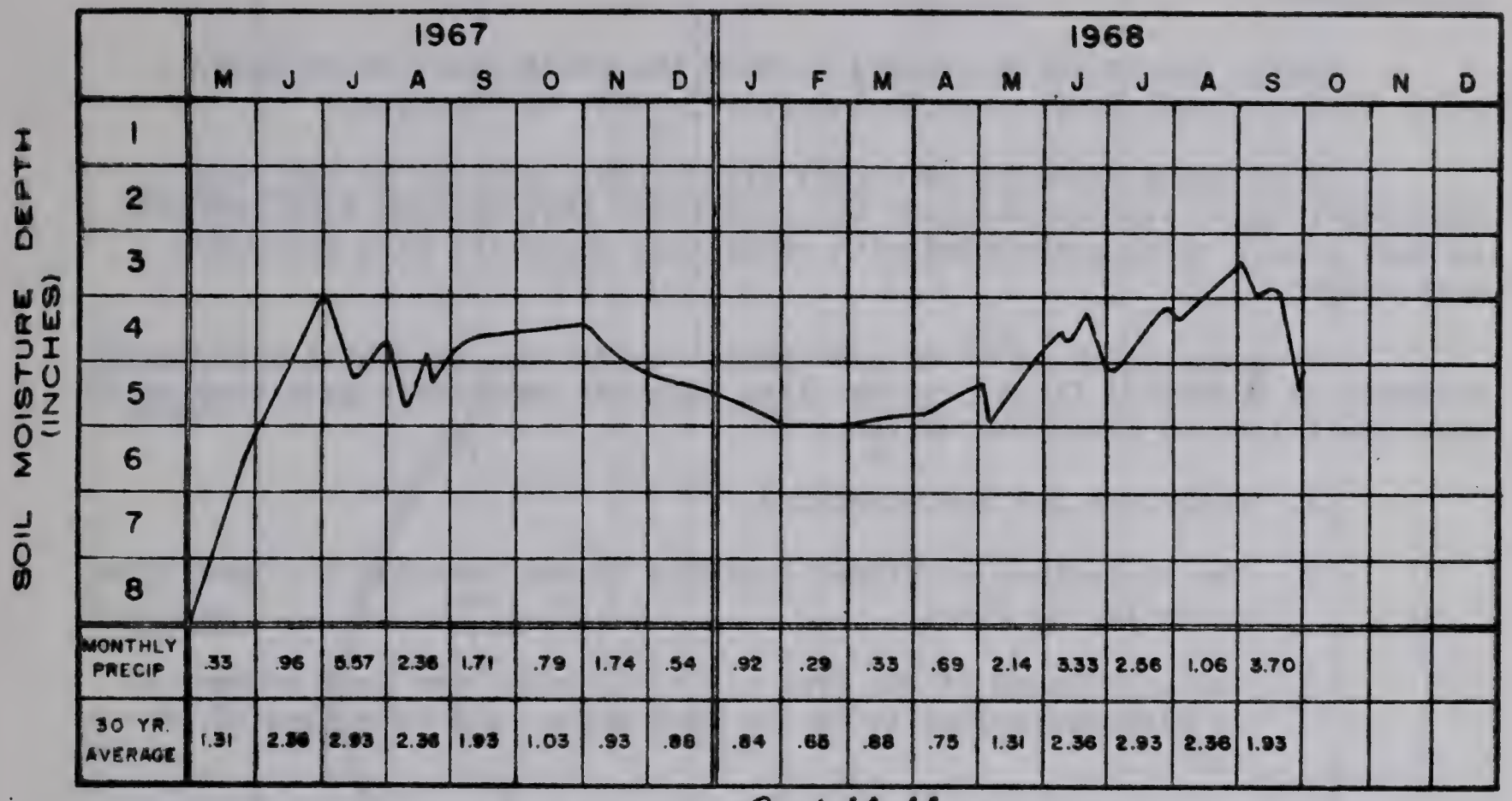
SOIL MOISTURE INDEX



	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MONTHLY PRECIP.	.28	1.06	5.87	1.33	2.23	1.58	1.31	.86	.92	.28	1.17	.26	.80	.67	2.65	.56	.70			
30 YR. AVERAGE	1.34	1.83	2.21	1.69	1.17	.76	.89	1.02	.84	.78	.84	.55	1.34	1.83	2.21	1.69	1.17			

STATION *Fort Vermilion C.D.A.*

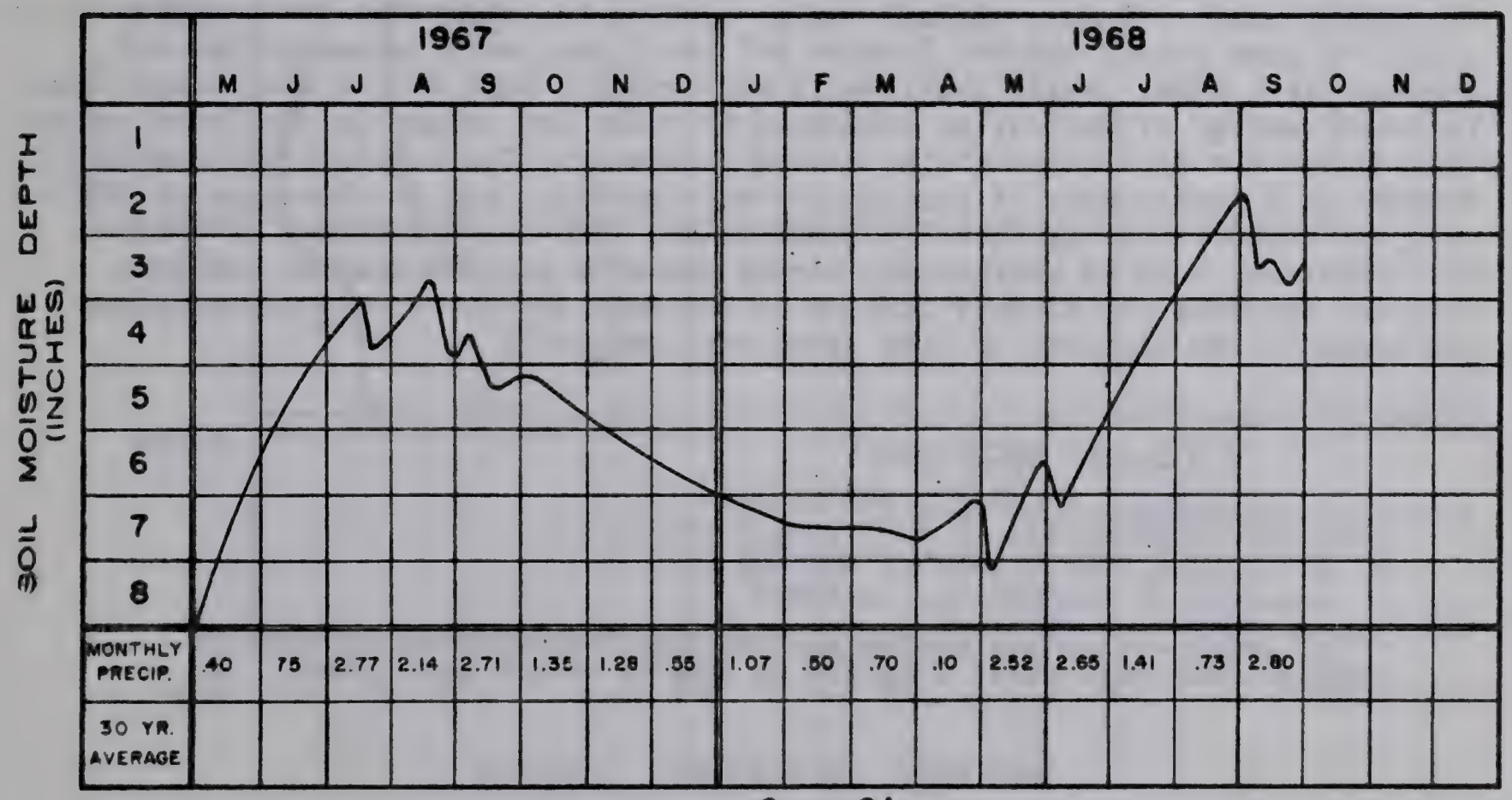
SOIL MOISTURE INDEX



	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MONTHLY PRECIP	.33	.96	5.57	2.36	1.71	.79	1.74	.54	.92	.29	.33	.69	2.14	3.33	2.56	1.06	3.70			
30 YR. AVERAGE	1.31	2.36	2.93	2.36	1.93	1.03	.93	.86	.84	.65	.88	.75	1.31	2.36	2.93	2.36	1.93			

STATION *Fort McMurray*

SOIL MOISTURE INDEX



	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MONTHLY PRECIP.	.40	75	2.77	2.14	2.71	1.35	1.28	.55	1.07	.50	.70	.10	2.52	2.65	1.41	.73	2.80			
30 YR. AVERAGE																				

STATION *Fort Chipewyan*

WINDS ALOFT

Daily charts are presented to show the winds aloft twice daily at Stony Plain, a radiosonde station immediately west of Edmonton.

Wind speed normally increases with height, however it has been observed in past studies of upper air conditions that extreme fire behavior is most likely to be associated with conditions where the wind decreases with height.

From past studies[1] of atmospheric conditions that have accompanied a number of blowup[2] fires, extreme fire behavior conditions have been noted when the following conditions exist:

1. Fuels are dry and plentiful.

2. The atmosphere is either unstable or was unstable for some time, prior to the fire.

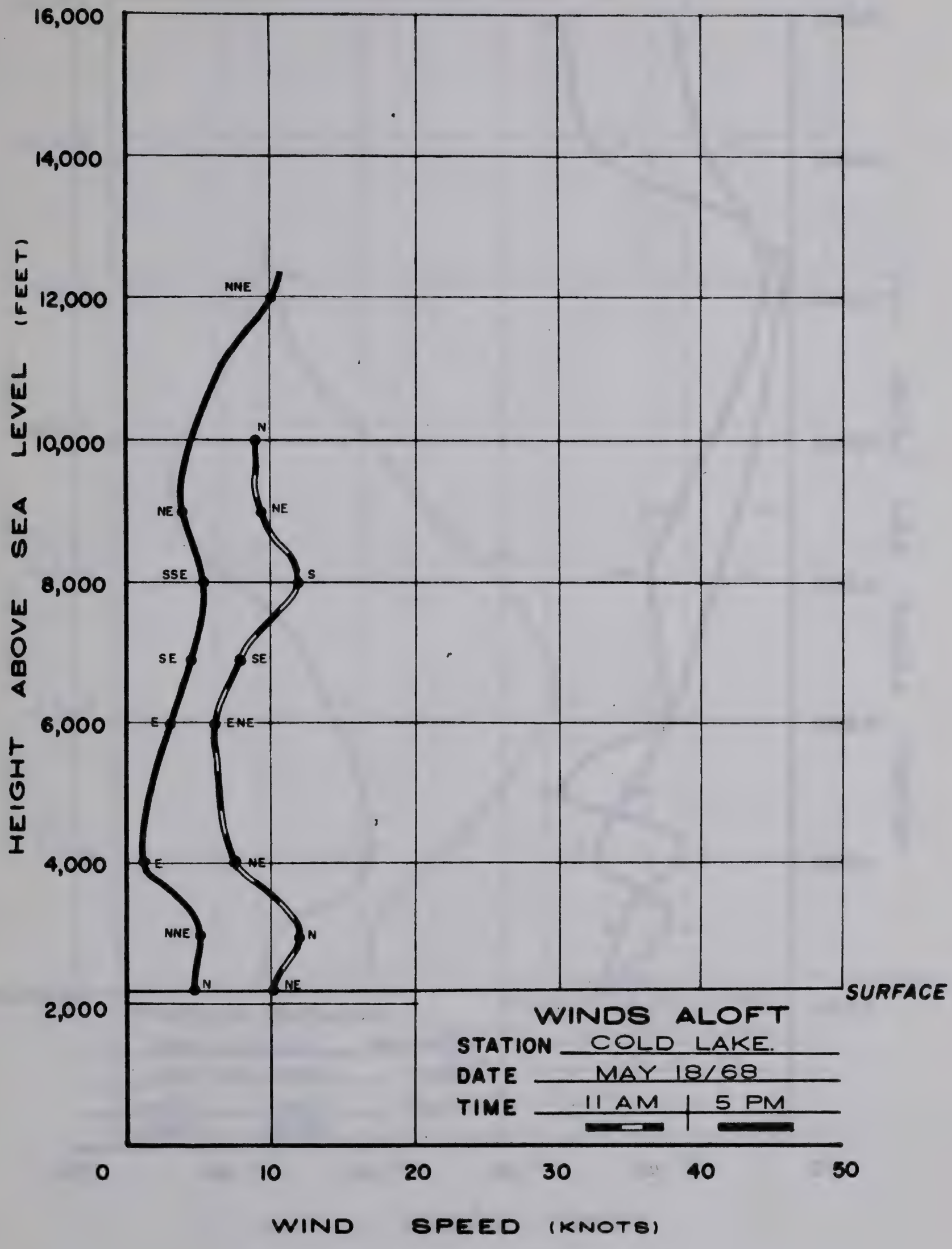
3. The wind speed of the free air is 18 miles per hour or more at an elevation equal to or not much above, the elevation of the fire.

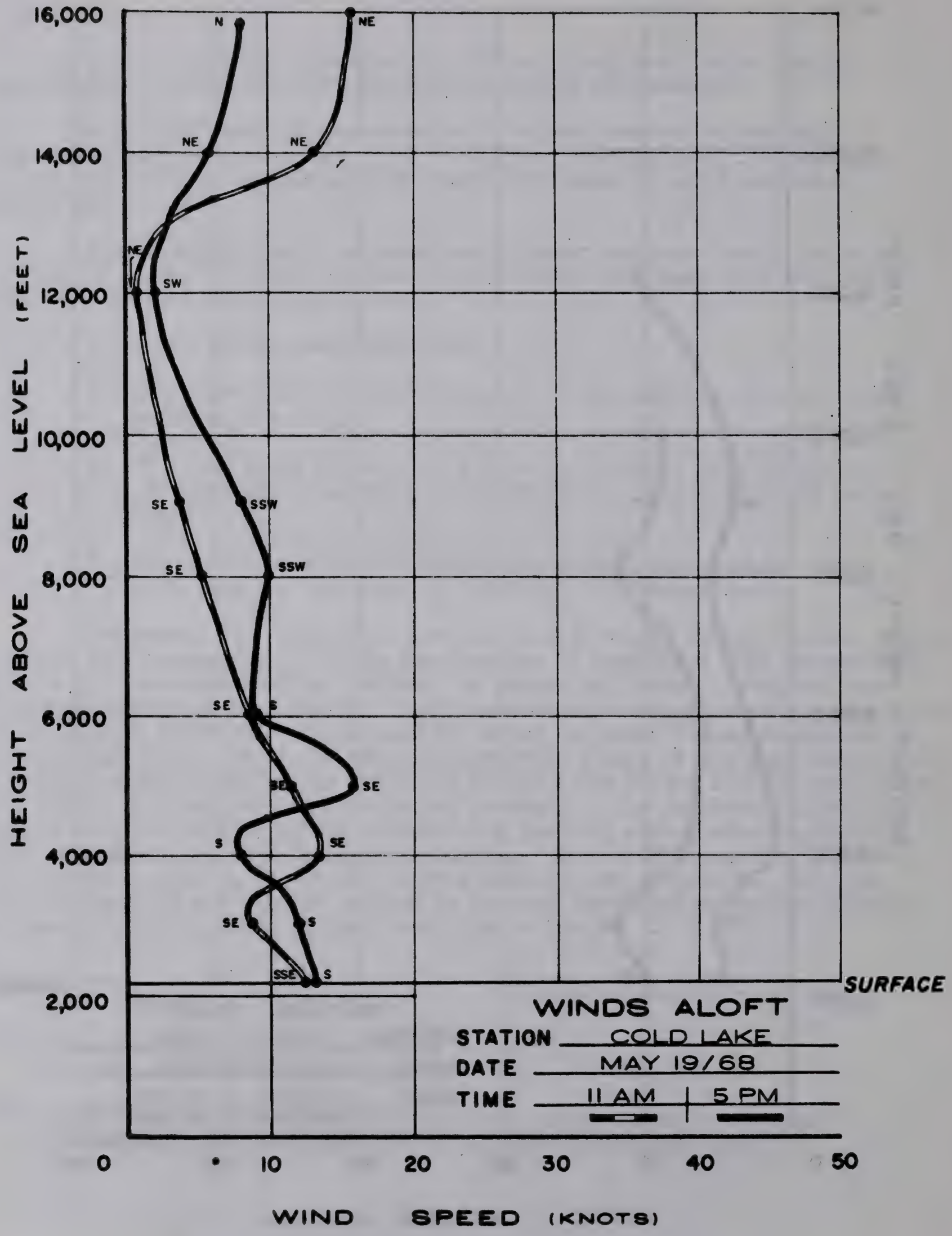
4. The wind decreases with height for several thousand feet above the fire with the exception of the first few hundred feet.

The manual for forest fire control, United States Forest Service, Region 7 offers this explanation: "It is the decrease of wind speed with height which permits a fire to develop its 'chimney' or convection column. With the fast developing smoke column a violent chain reaction in energy conversion takes place which, on some fires, has not leveled off until the smoke column is several thousand feet high. While the fire is converting a part of its heat energy into turbulent energy of motion, as evidenced by rolls and surges in the smoke column, this drives the fire on to an increasing intensity. The accelerating rapidity depends on a continuance of the adverse wind profile, and an abundance of dry fuel, to support the high level of combustion. The worst features of extreme fire behavior, such as whirlwinds, strong updrafts and downdrafts, and long distance spotting are closely related to the well developed convection column, and hence to the decrease of wind speed with height."

(1) "Low level jet winds: a survey of literature"
R. E. Traylor, University of Montana 1960

(2) Byram (1954) defined a blowup fire as one which suddenly and often unexpectedly multiplies its rate of energy output many times.


16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
HEIGHT ABOVE SEA LEVEL (FEET)
NNE
N
NE
NE
SSE
S
SE
SE
E
ENE
E
NE
NNE
N
N
NE
SURFACE
WINDS ALOFT
STATION COLD LAKE.
DATE MAY 18/68
TIME 11 AM | 5 PM
0
10
20
30
40
50
WIND SPEED (KNOTS)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HEIGHT ABOVE SEA LEVEL (FEET)
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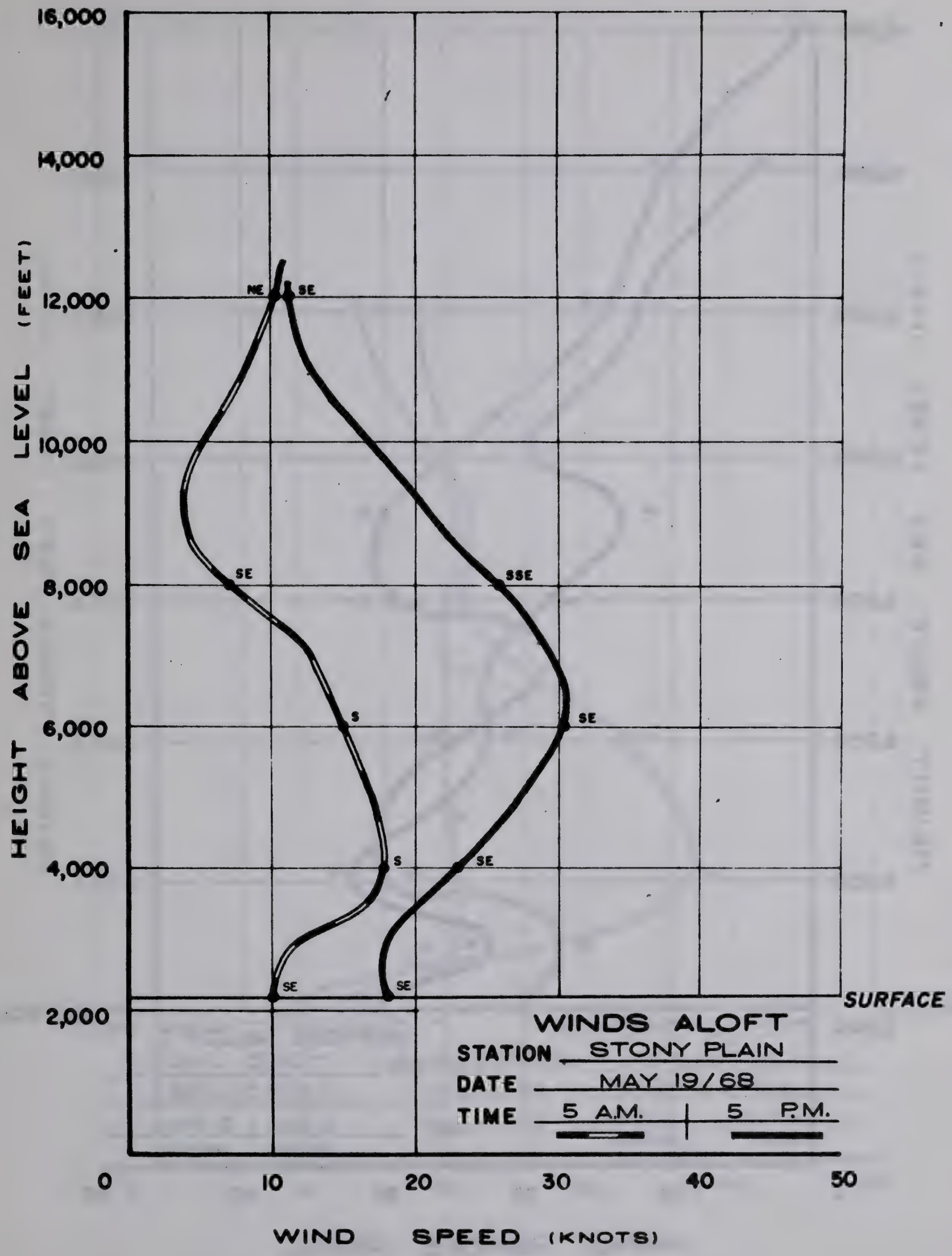
NE
SW
SE
SSW
SE
SSW
SE
S
SE
SE
S
SE
S
SE
S
SSE
S
SURFACE
WINDS ALOFT
STATION COLD LAKE
DATE MAY 19/68
TIME 11 AM | 5 PM
0
10
20
30
40
50
WIND SPEED (KNOTS)


16,000
14,000
12,000
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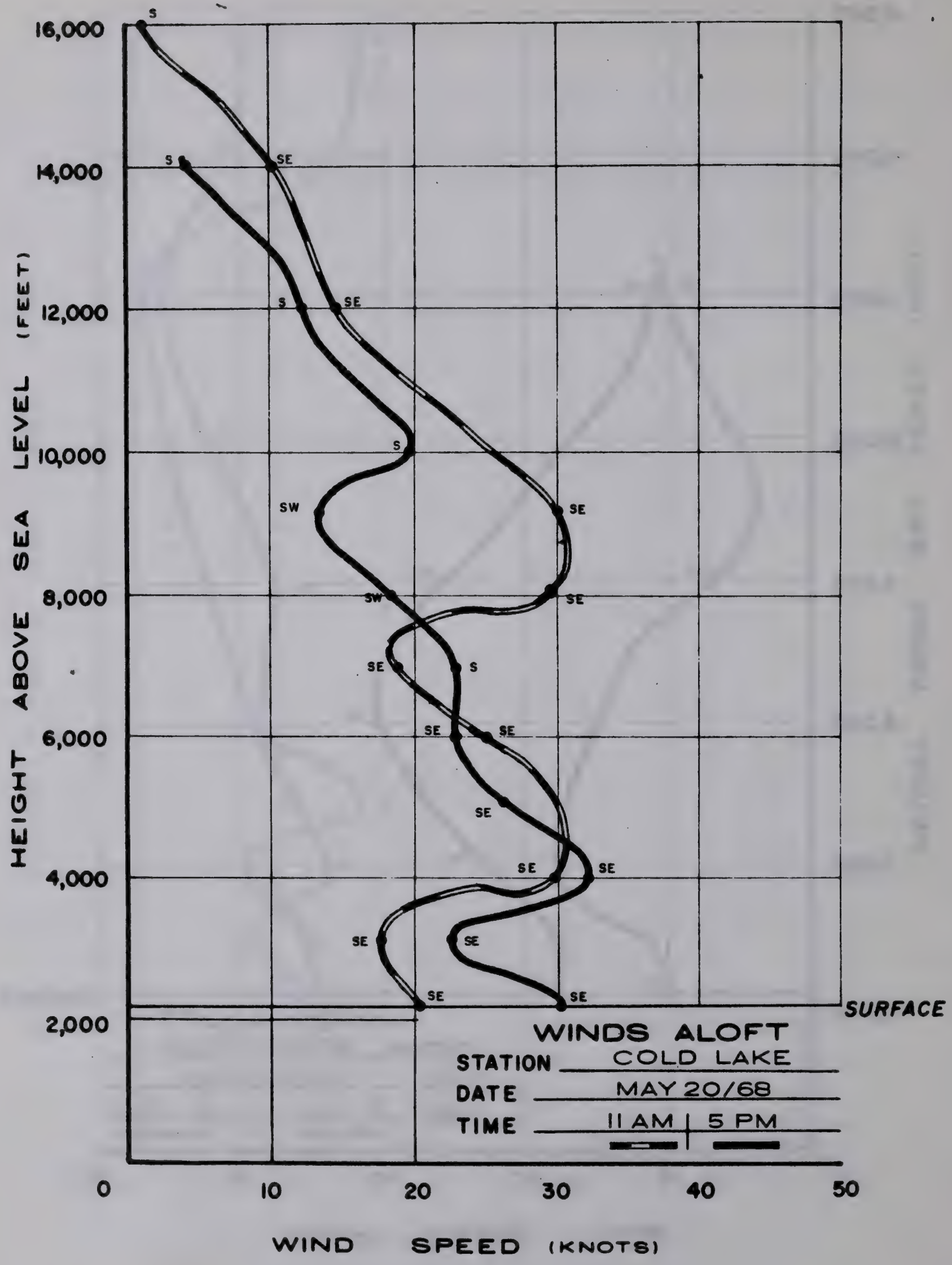
6,000
4,000
2,000
HEIGHT ABOVE SEA LEVEL (FEET)
NE
SE
SE
SSE
S
SE
S
SE
SE
SE
SURFACE
WINDS ALOFT
STATION STONY PLAIN
DATE MAY 19/68
TIME 5 A.M. | 5 P.M.
0
10
20
30
40
50
WIND SPEED (KNOTS)


16,000
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6,000
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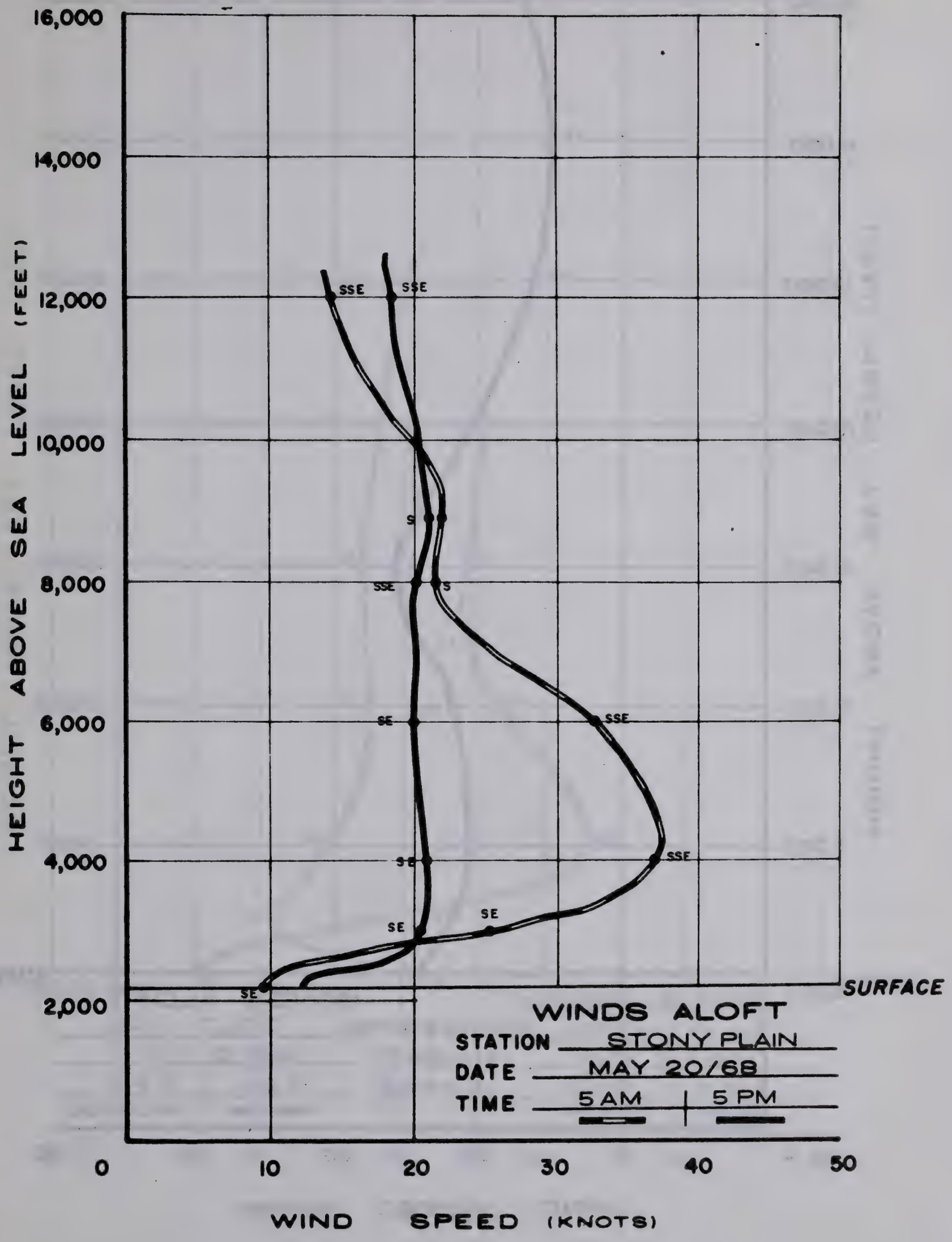
2,000
ABOVE SEA LEVEL (FEET)
HEIGHT
SURFACE
0
10
20
30
40
50
WIND SPEED (KNOTS)
WINDS ALOFT
STATION COLD LAKE
DATE MAY 20/68
TIME 11 AM | 5 PM


16,000
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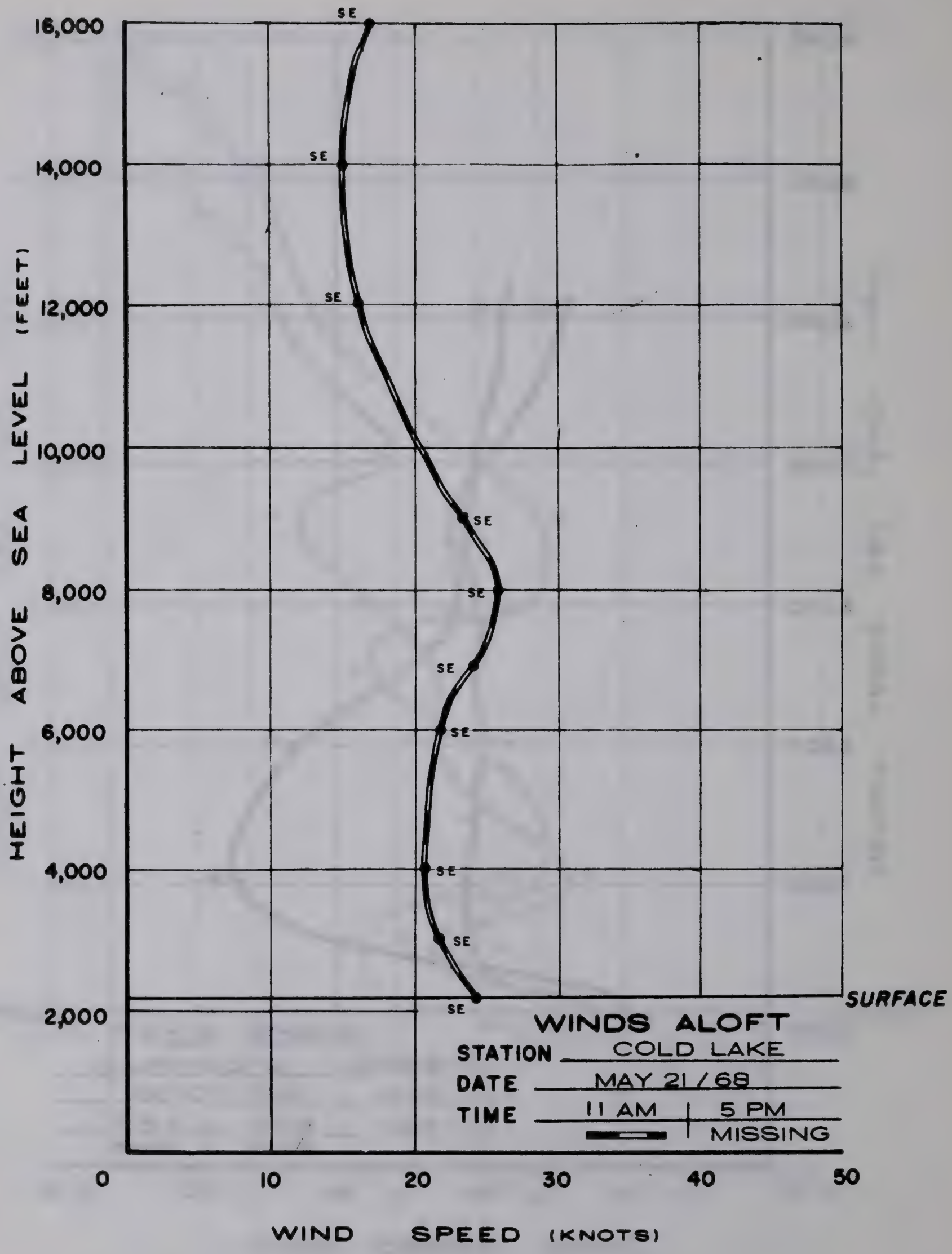
2,000
HEIGHT ABOVE SEA LEVEL (FEET)
SSE
SSE
S
SSE
S
SE
SSE
SSE
SE
SE
SE
SURFACE
WINDS ALOFT
STATION STONY PLAIN
DATE MAY 20/68
TIME 5 AM | 5 PM
0
10
20
30
40
50
WIND SPEED (KNOTS)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10,000
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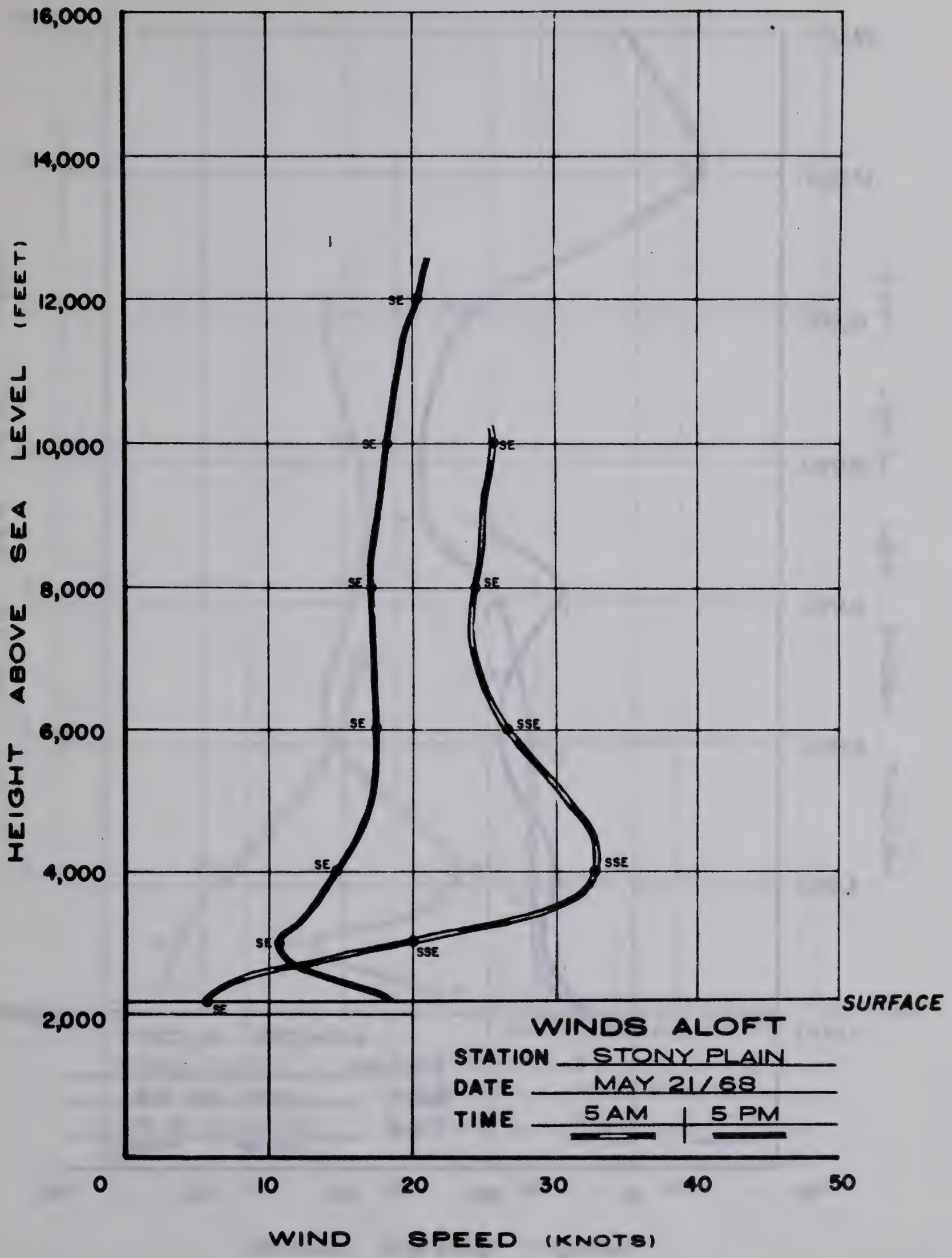
6,000
4,000
2,000
HEIGHT ABOVE SEA LEVEL (FEET)
SE
SURFACE
WINDS ALOFT
STATION COLD LAKE
DATE MAY 21/68
TIME 11 AM | 5 PM
MISSING
0
10
20
30
40
50
WIND SPEED (KNOTS)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6,000
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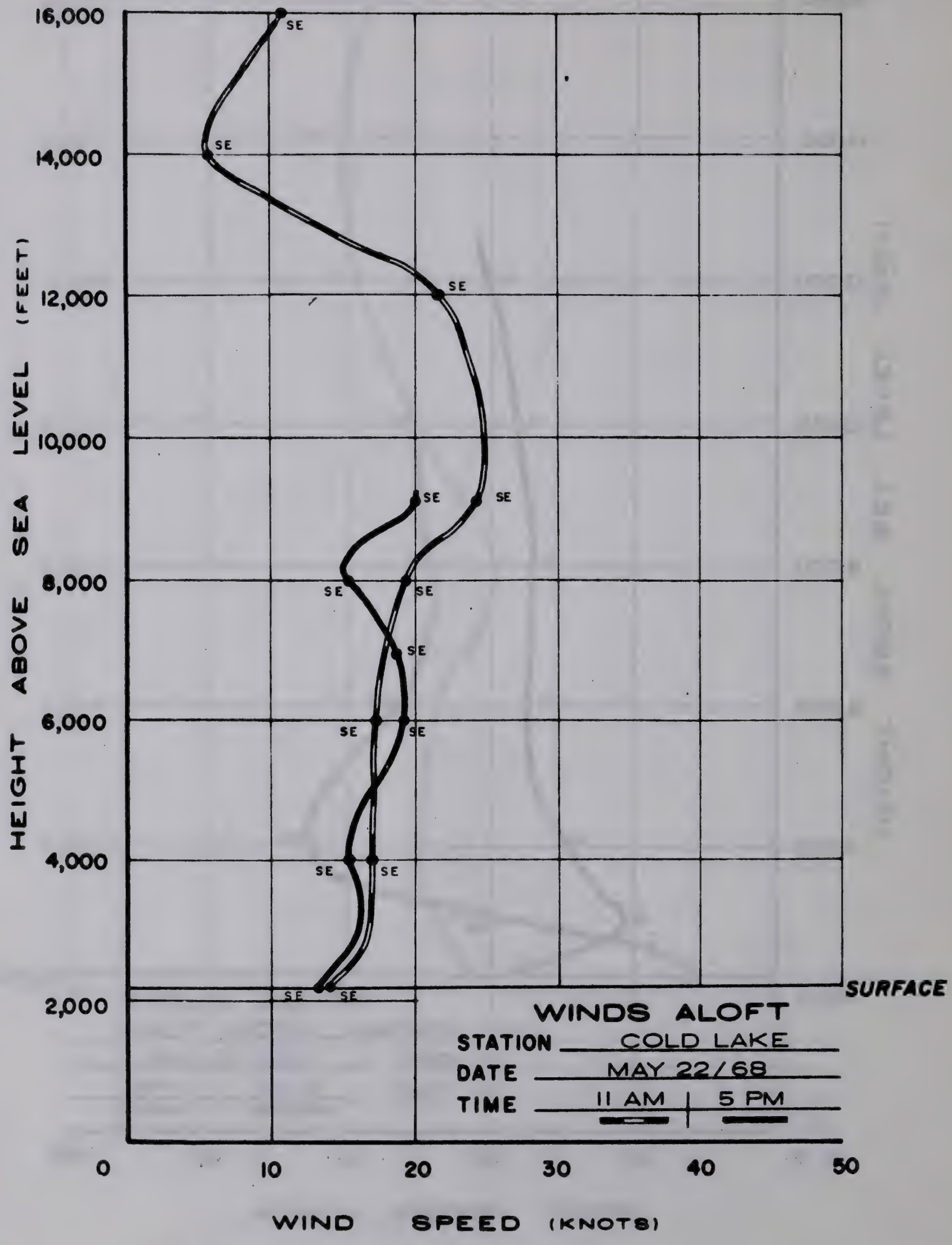
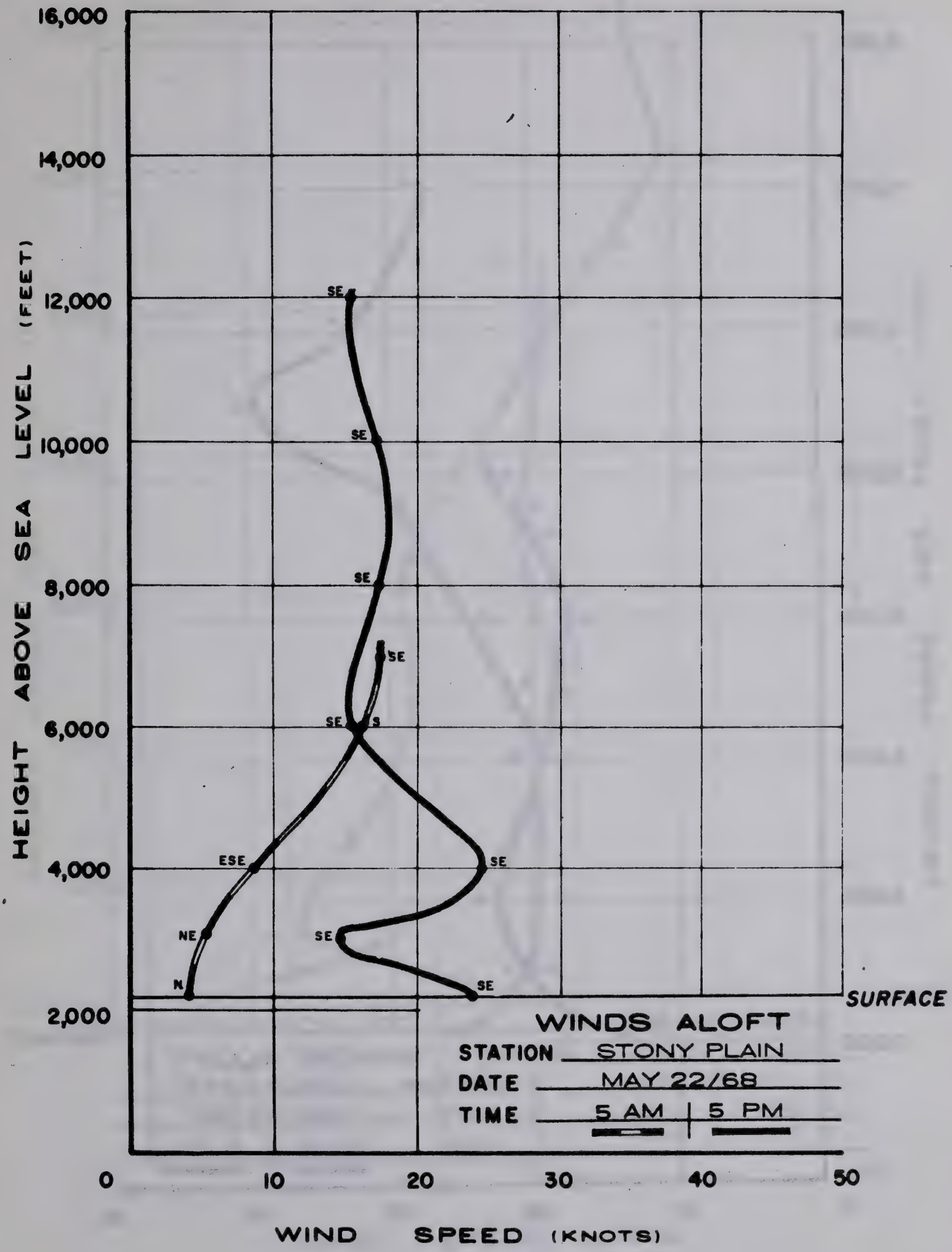
ABOVE SEA LEVEL (FEET)
HEIGHT
SE
SSE
SURFACE
WINDS ALOFT
STATION STONY PLAIN
DATE MAY 21/68
TIME 5 AM | 5 PM
0
10
20
30
40
50
WIND SPEED (KNOTS)


16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
HEIGHT ABOVE SEA LEVEL (FEET)
SE
SURFACE
WINDS ALOFT
STATION COLD LAKE
DATE MAY 22/68
TIME 11 AM | 5 PM
0
10
20
30
40
50
WIND SPEED (KNOTS)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12,000
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HEIGHT ABOVE SEA LEVEL (FEET)
SE
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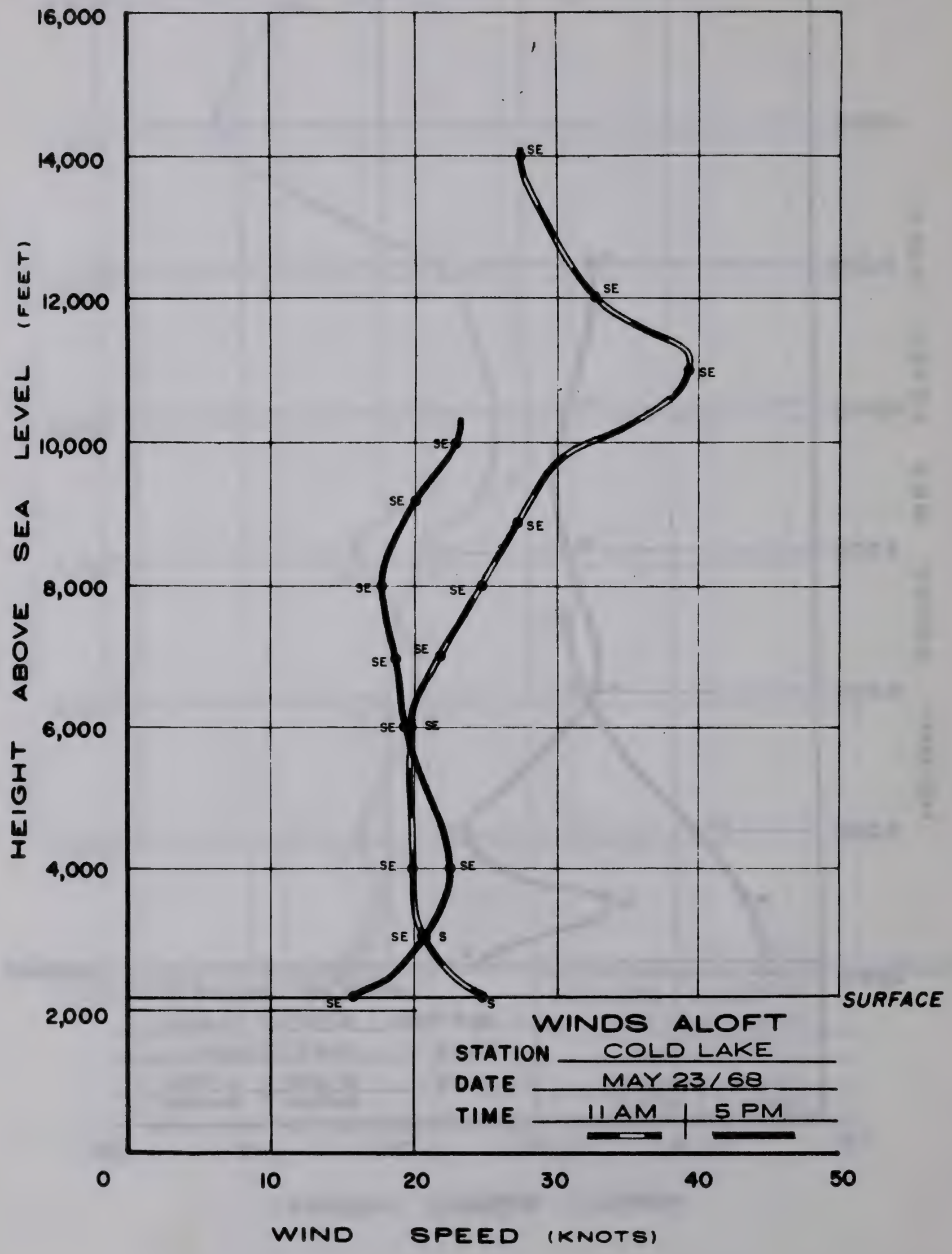
SE
S
ESE
SE
NE
SE
N
SE
SURFACE
WINDS ALOFT
STATION STONY PLAIN
DATE MAY 22/68
TIME 5 AM | 5 PM
0
10
20
30
40
50
WIND SPEED (KNOTS)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HEIGHT ABOVE SEA LEVEL (FEET)
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SURFACE
WINDS ALOFT
STATION COLD LAKE
DATE MAY 23/68
TIME 11 AM | 5 PM
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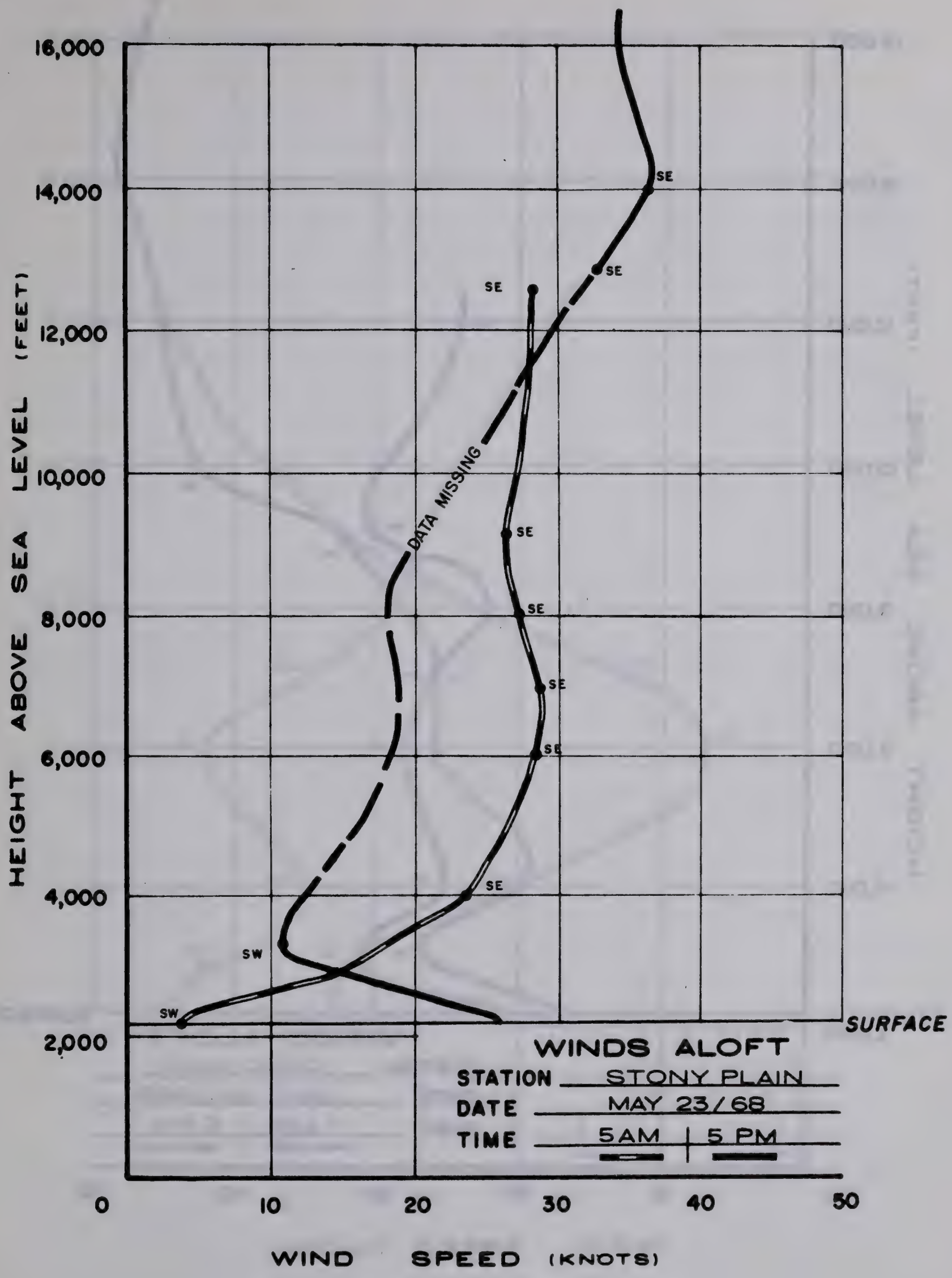
20
30
40
50
WIND SPEED (KNOTS)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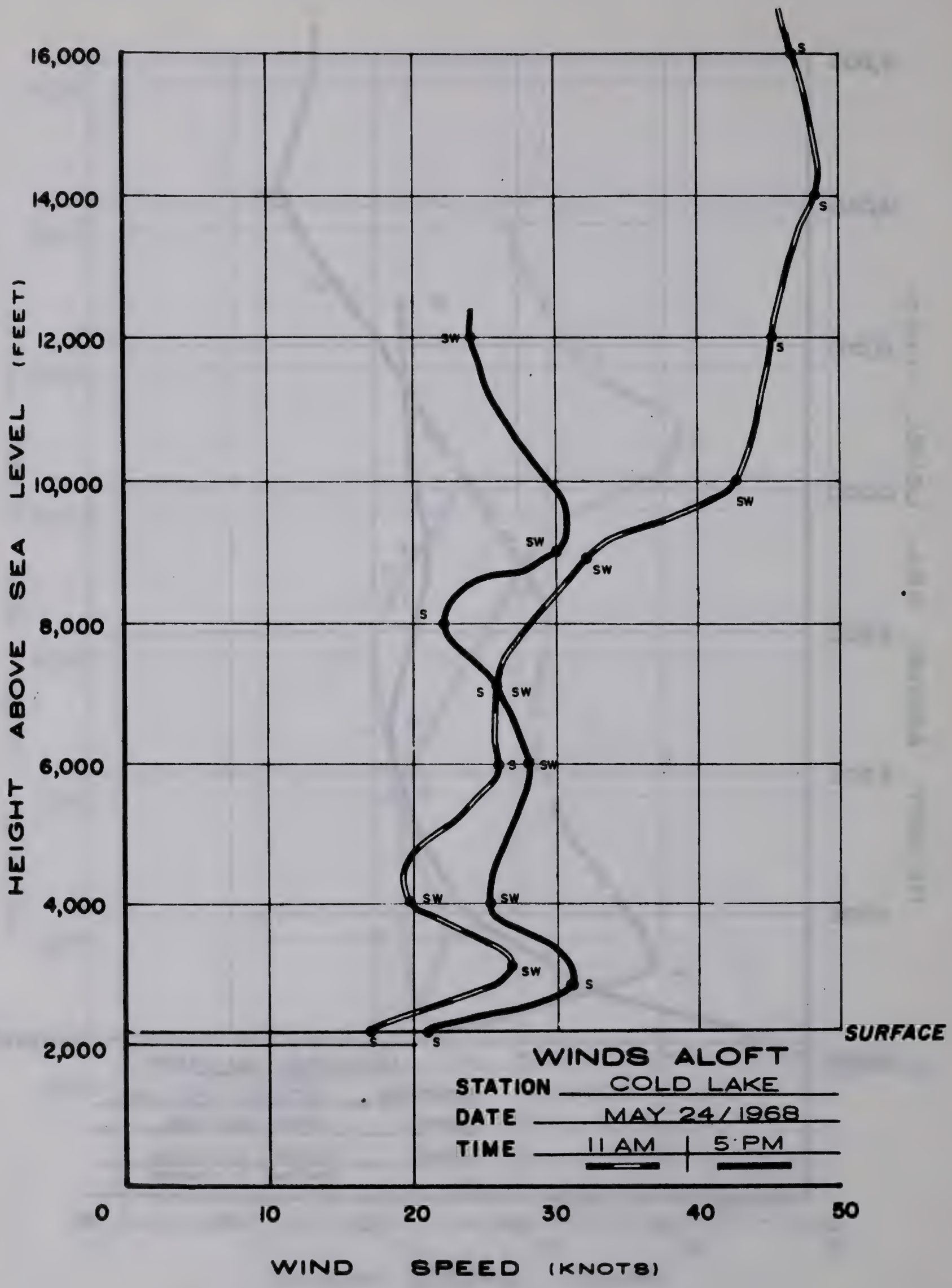
4,000
2,000
HEIGHT ABOVE SEA LEVEL (FEET)
SURFACE
DATA MISSING
SE
SW
WINDS ALOFT
STATION STONY PLAIN
DATE MAY 23/68
TIME 5AM | 5 PM
0
10
20
30
40
50
WIND SPEED (KNOTS)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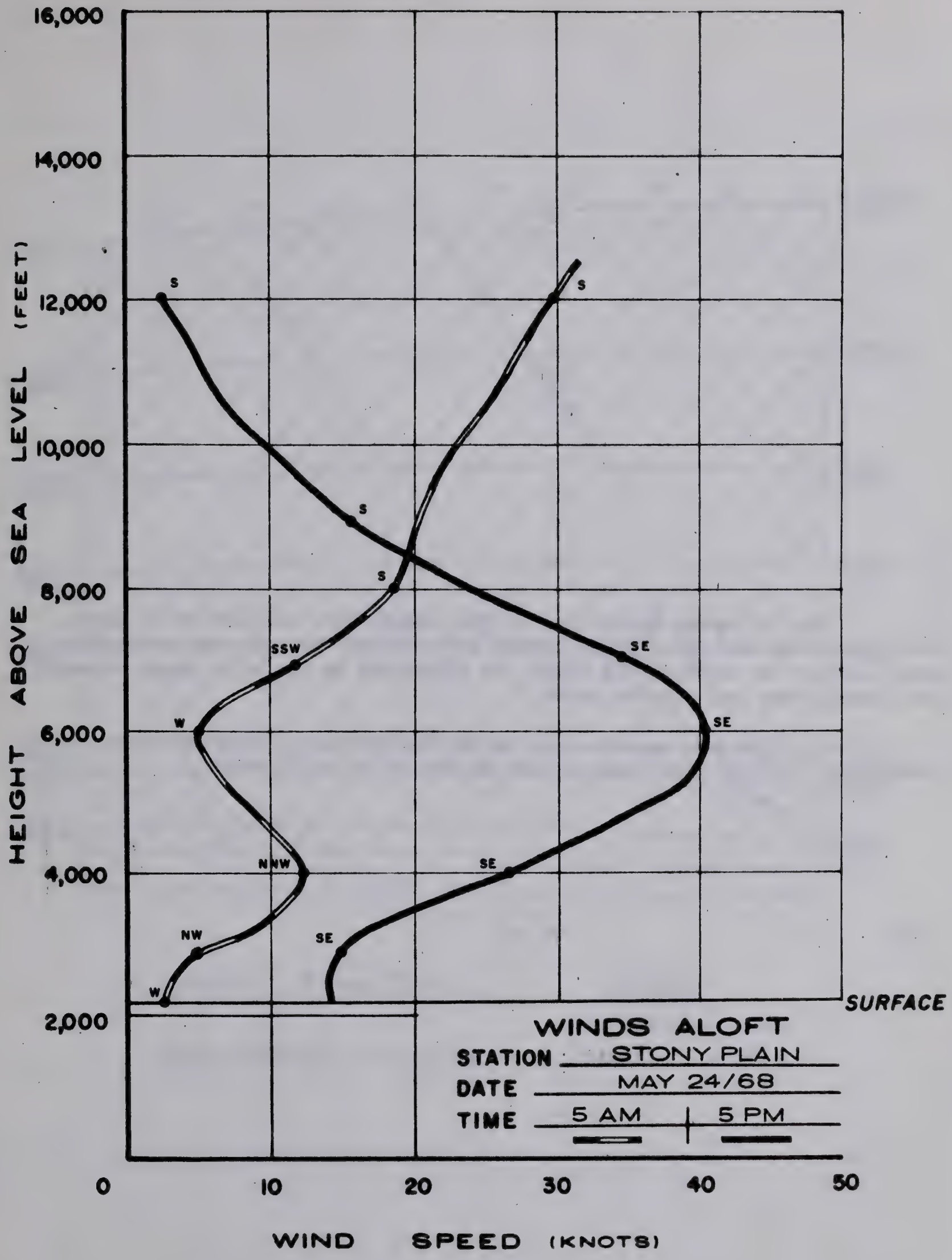
6,000
4,000
2,000
HEIGHT ABOVE SEA LEVEL (FEET)
SURFACE
0
10
20
30
40
50
WIND SPEED (KNOTS)
WINDS ALOFT
STATION COLD LAKE
DATE MAY 24/1968
TIME 11 AM | 5 PM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6,000
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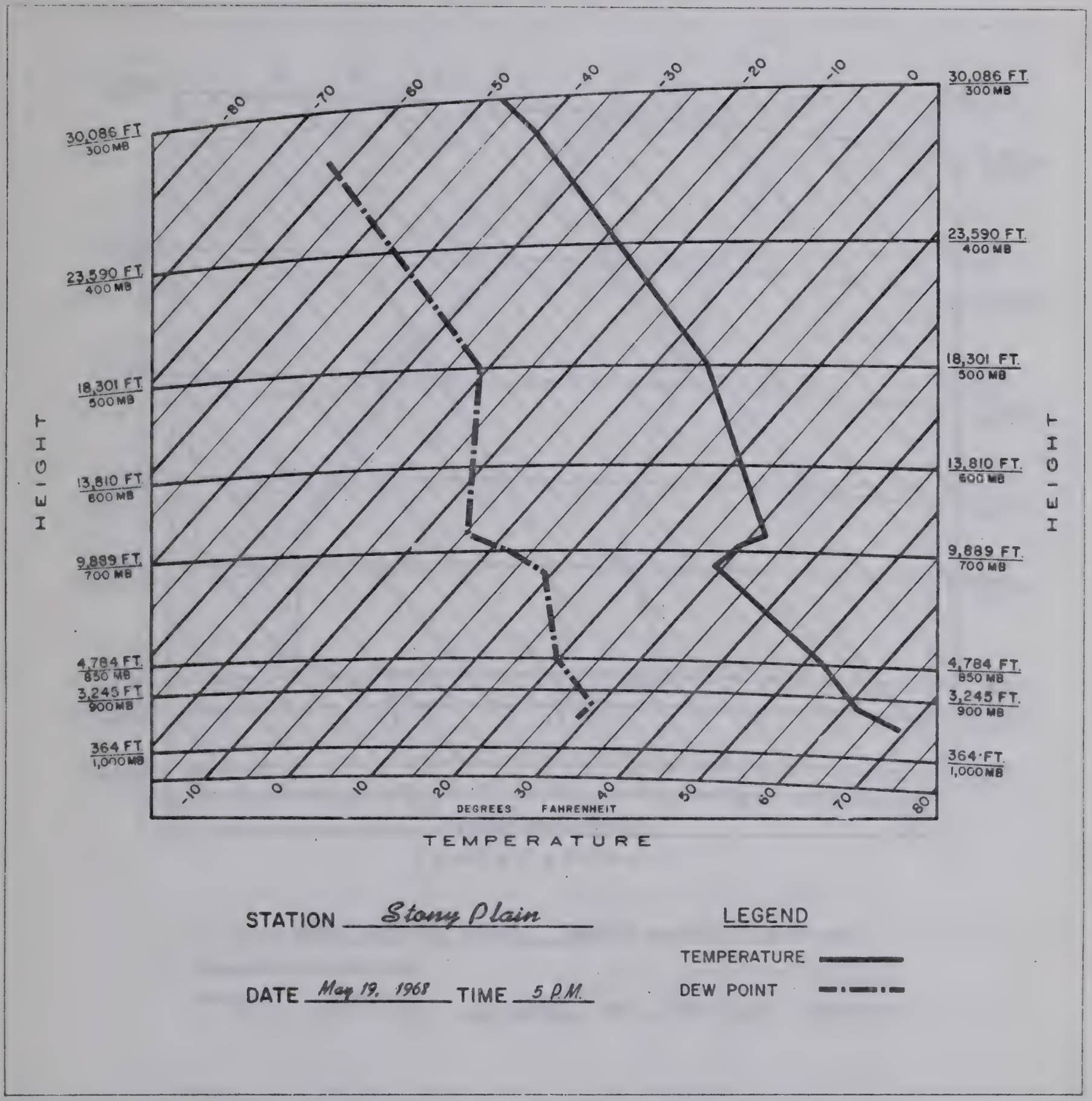
2,000
HEIGHT ABOVE SEA LEVEL (FEET)
S
S
S
S
SSW
SE
SE
W
NNW
SE
NW
SE
W
SURFACE
WINDS ALOFT
STATION STONY PLAIN
DATE MAY 24/68
TIME 5 AM | 5 PM
0
10
20
30
40
50
WIND SPEED (KNOTS)

The following graphs depict the temperature and dew point aloft. It can be seen that during the forest fire period, the air was extremely dry, both at the surface and aloft, as evidenced by the wide range between the temperature and the dew point.

With the arrival of cool, moist, Pacific air, the difference diminishes rapidly, and temperatures decreased at all levels.



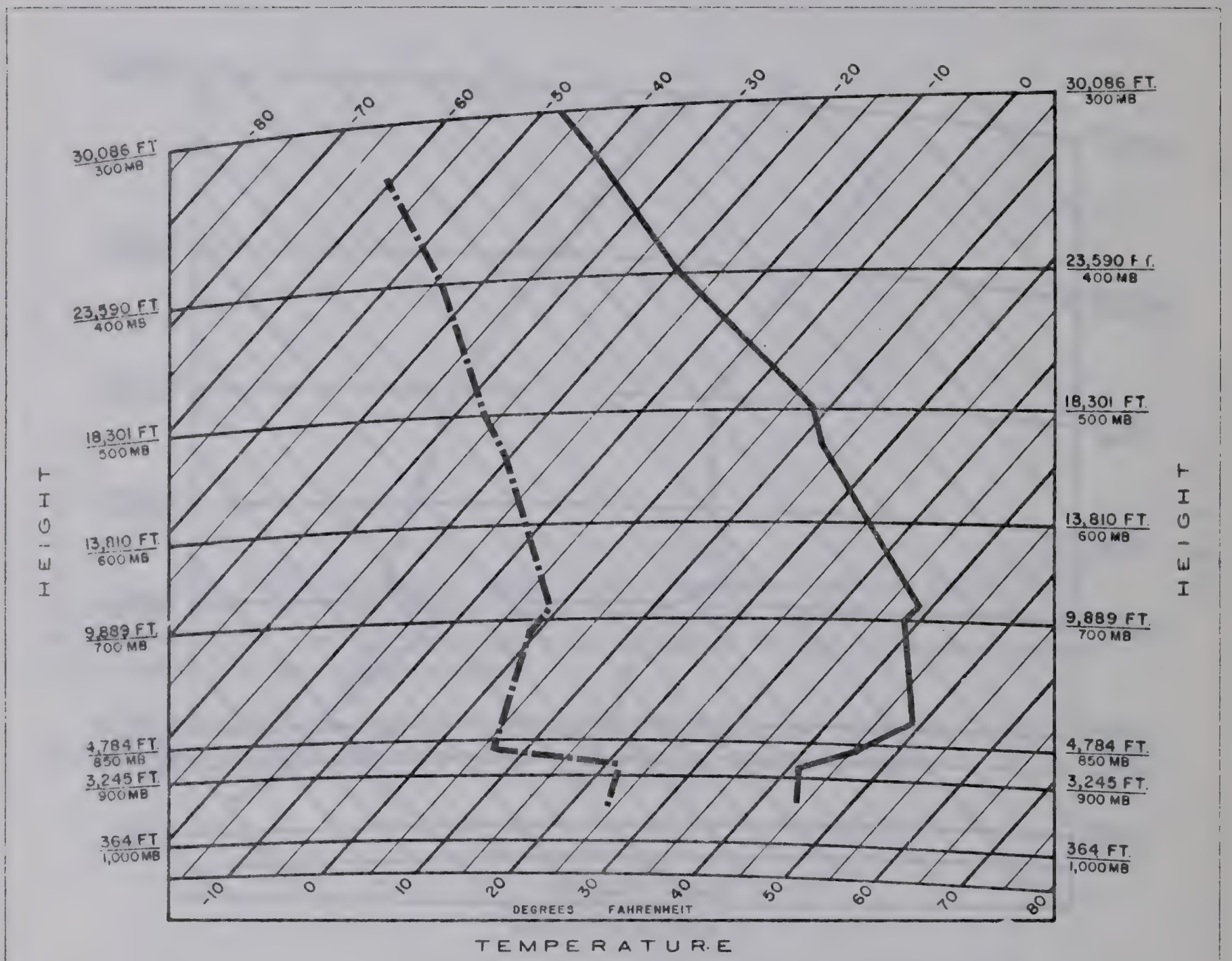
STATION *Stony Plain*

DATE *May 19, 1968* TIME *5 P.M.*

LEGEND

TEMPERATURE

DEW POINT



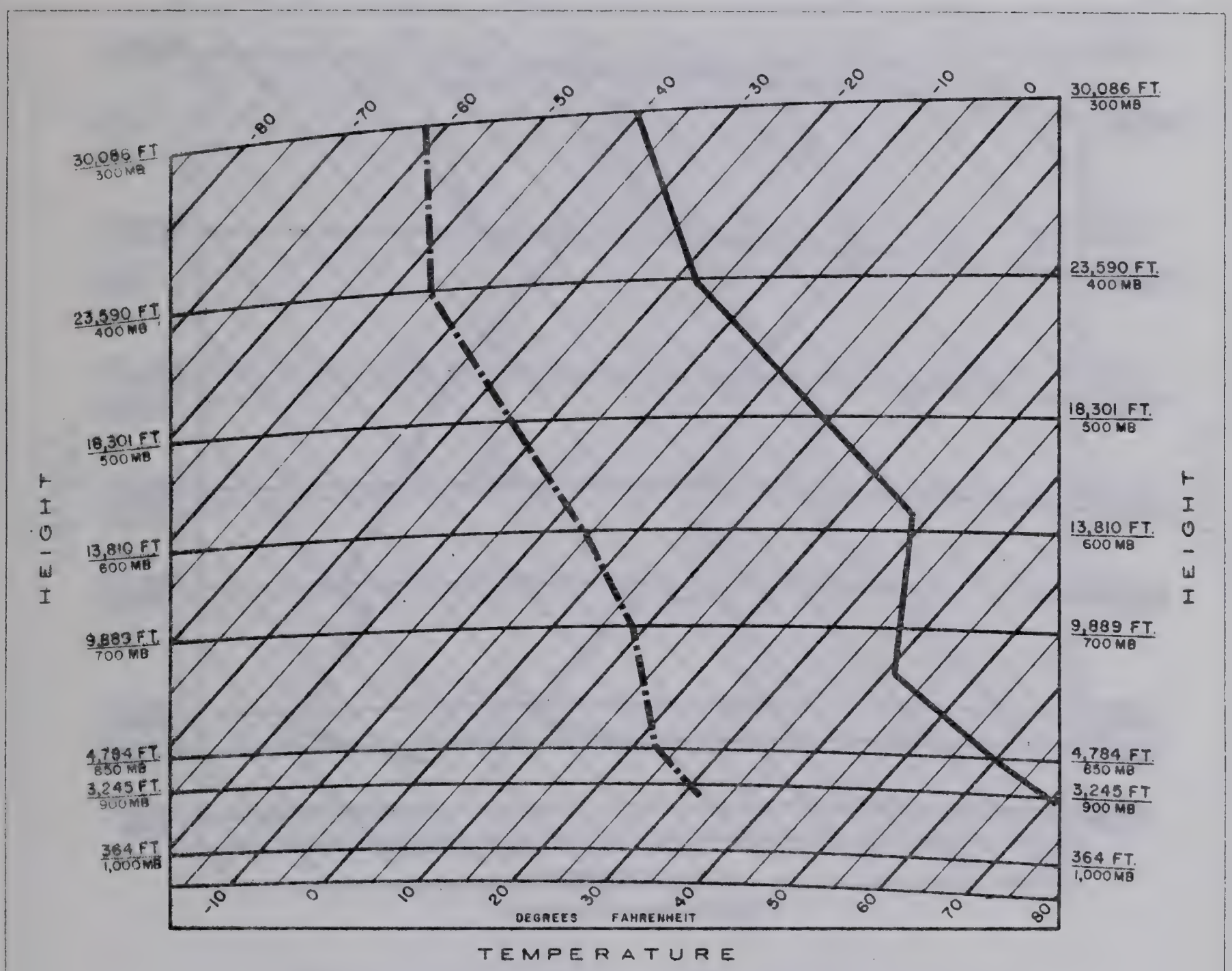
STATION *Stony Plain*

DATE *May 20, 1968* TIME *5 A.M.*

LEGEND

TEMPERATURE

DEW POINT



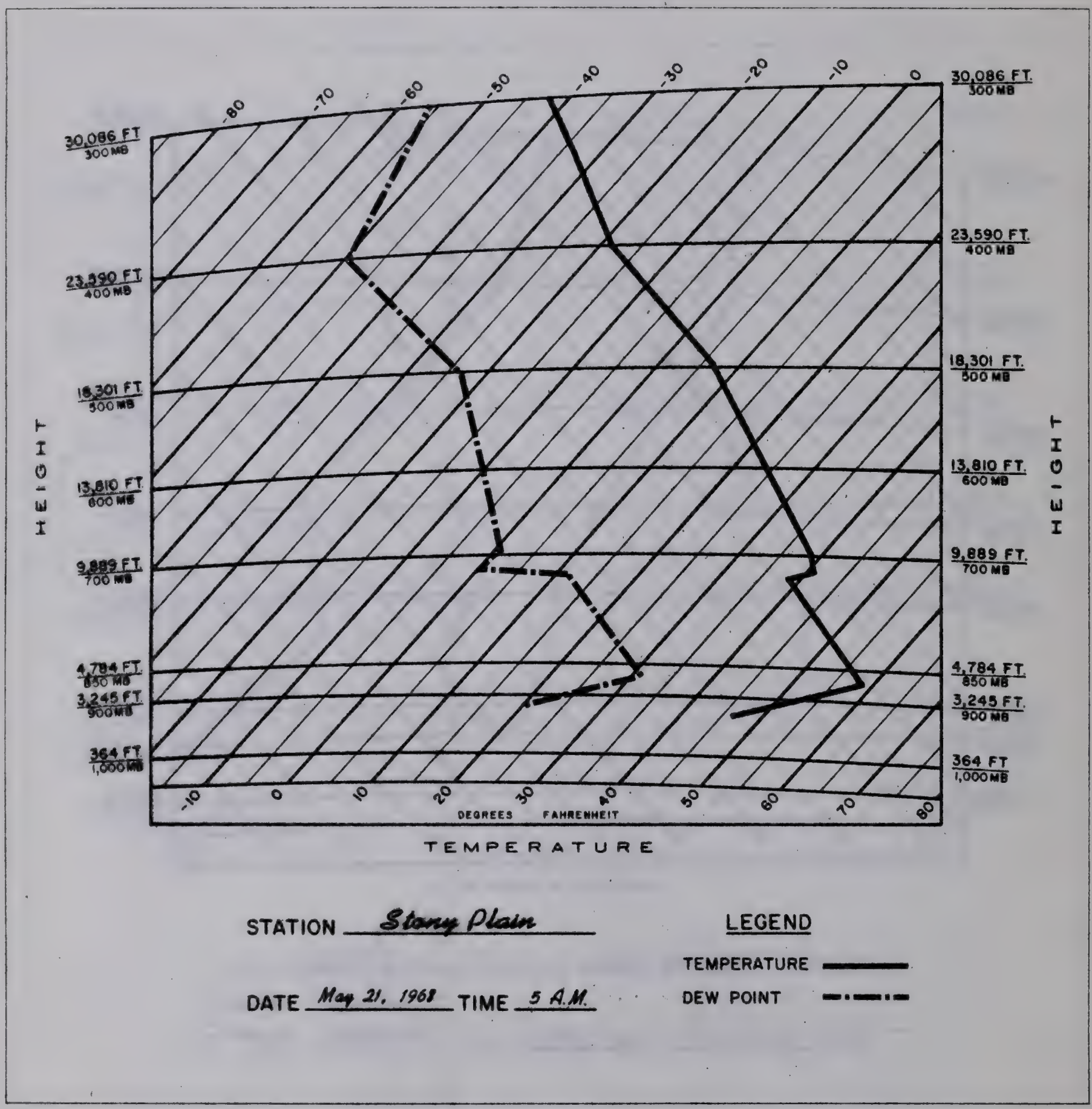
STATION Stony Plain

DATE May 20, 1968 TIME 5 P.M.

LEGEND

TEMPERATURE

DEW POINT



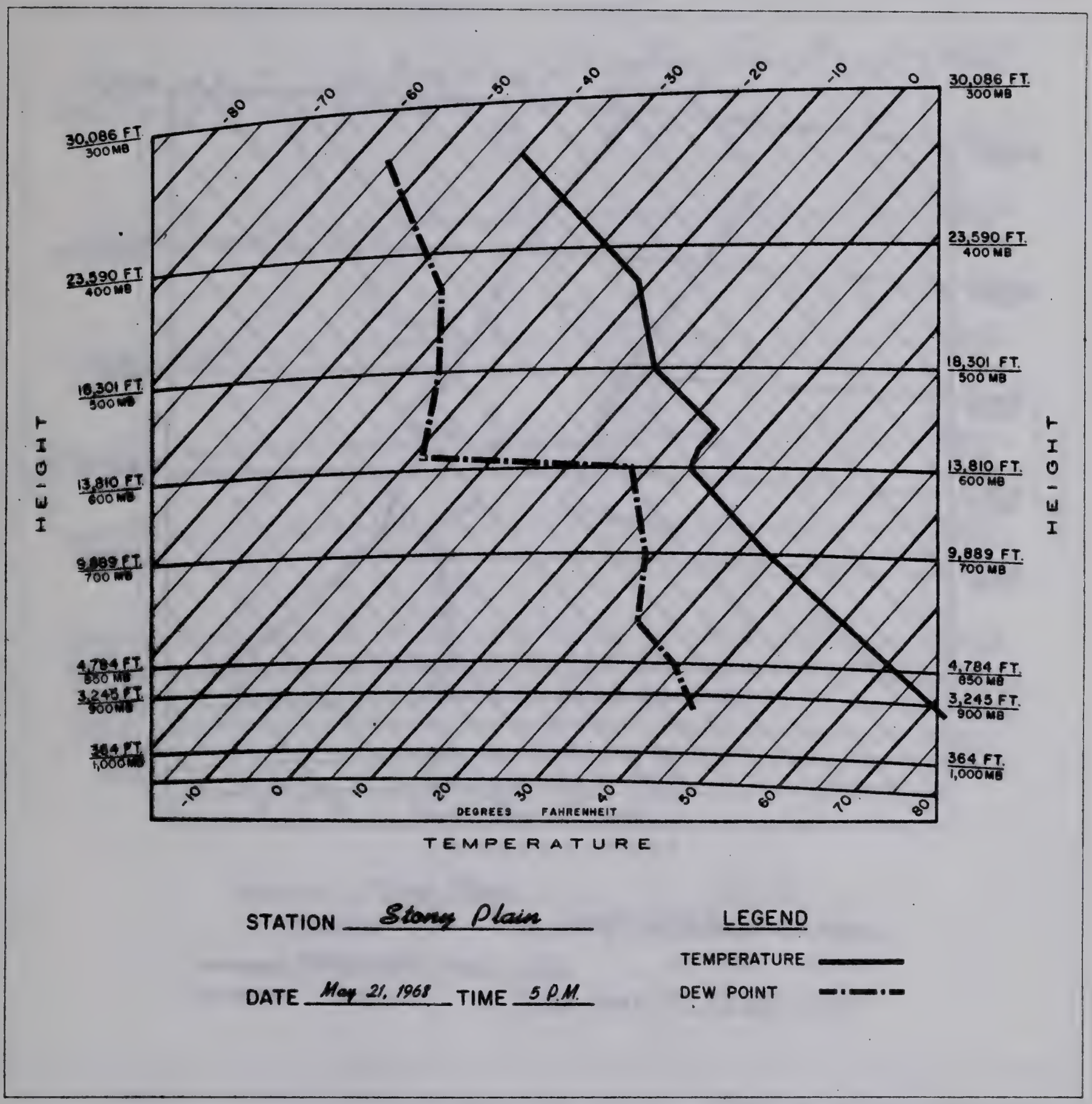
STATION Stony Plain

DATE May 21, 1968 TIME 5 A.M.

LEGEND

TEMPERATURE ——————

DEW POINT —·——·—



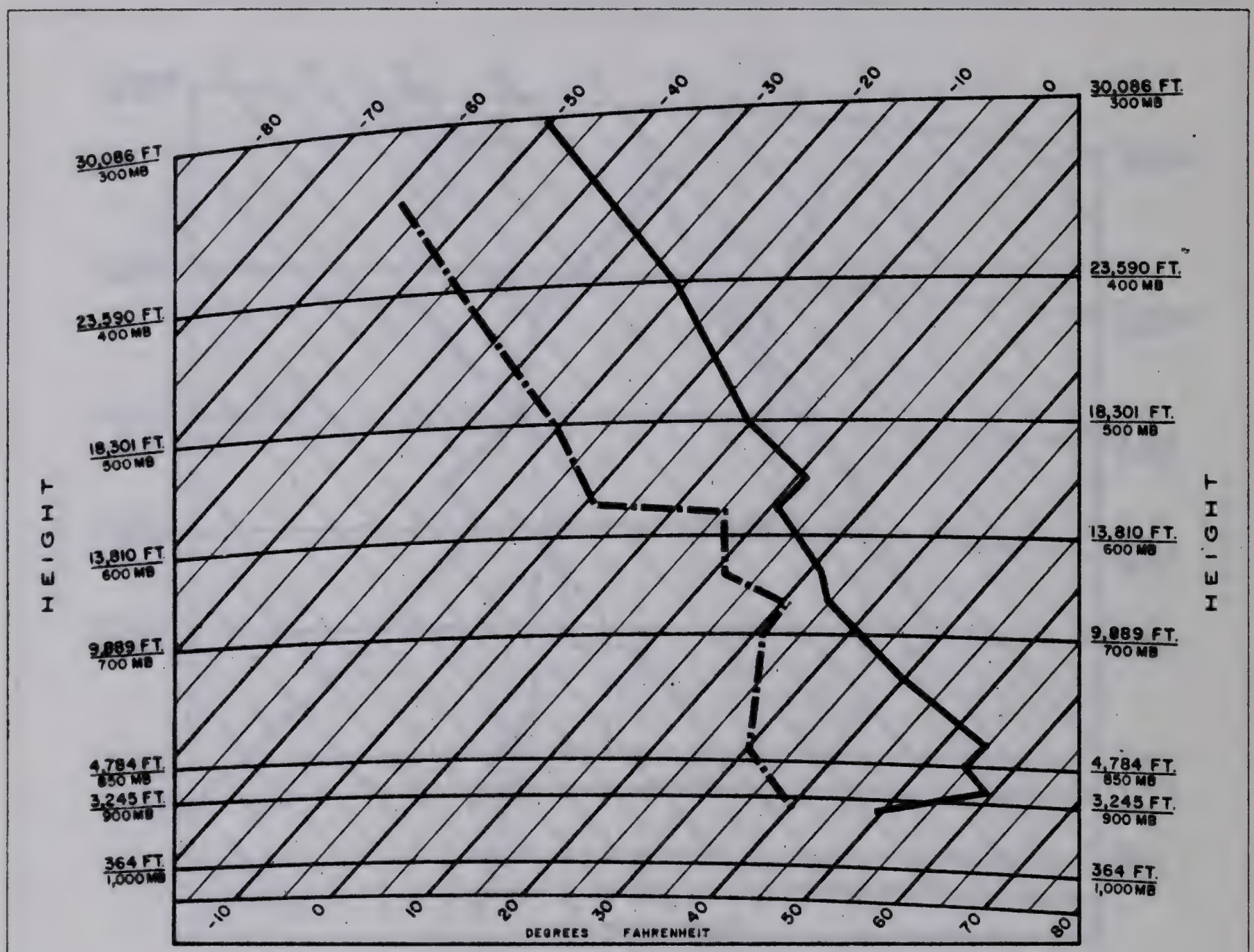
STATION Stony Plain

DATE May 21, 1968 TIME 5 P.M.

LEGEND

TEMPERATURE ——————

DEW POINT —·—·—



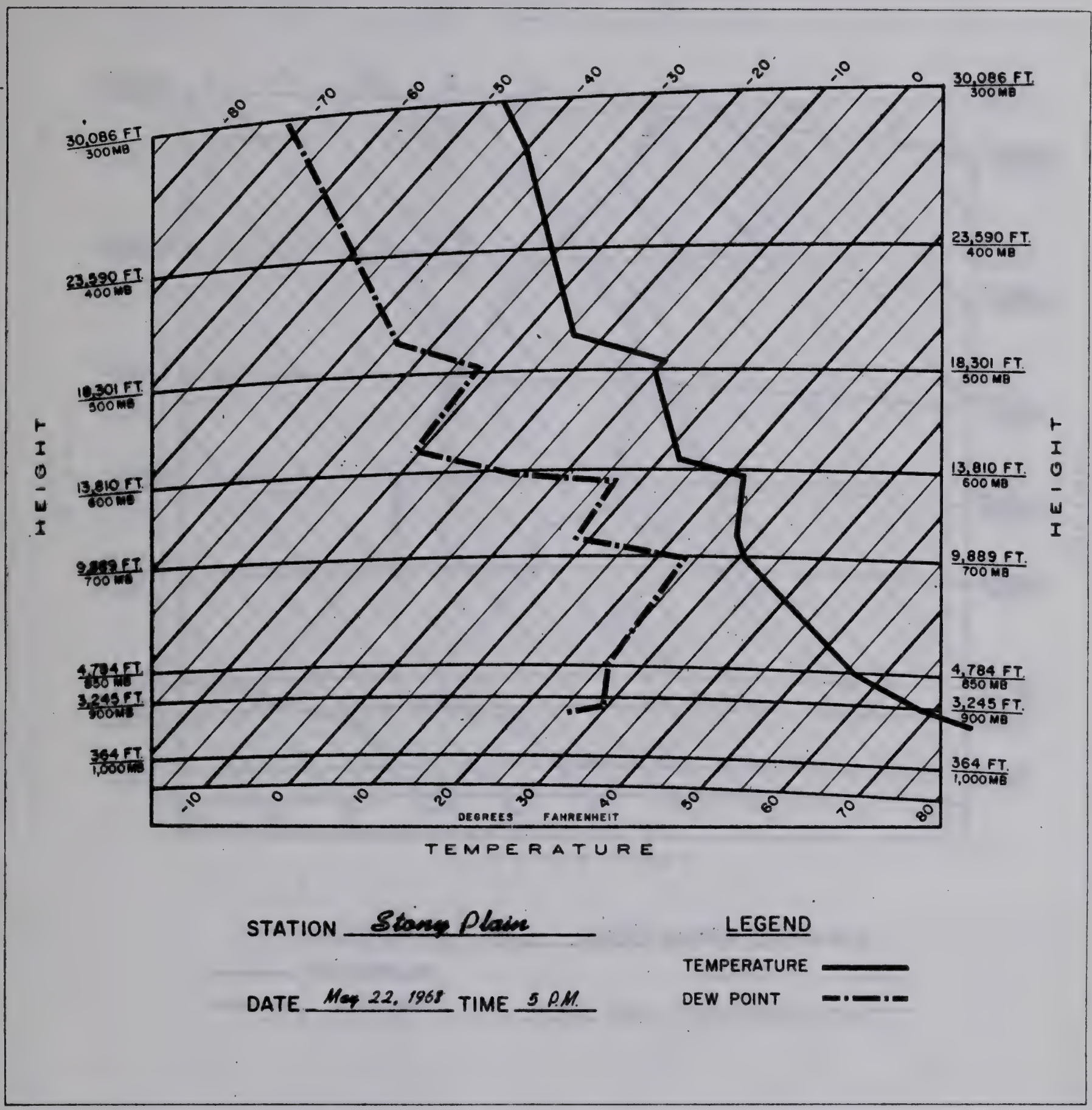
STATION Stony Plain

DATE May 22, 1968 TIME 5 A.M.

LEGEND

TEMPERATURE ——

DEW POINT —·—·—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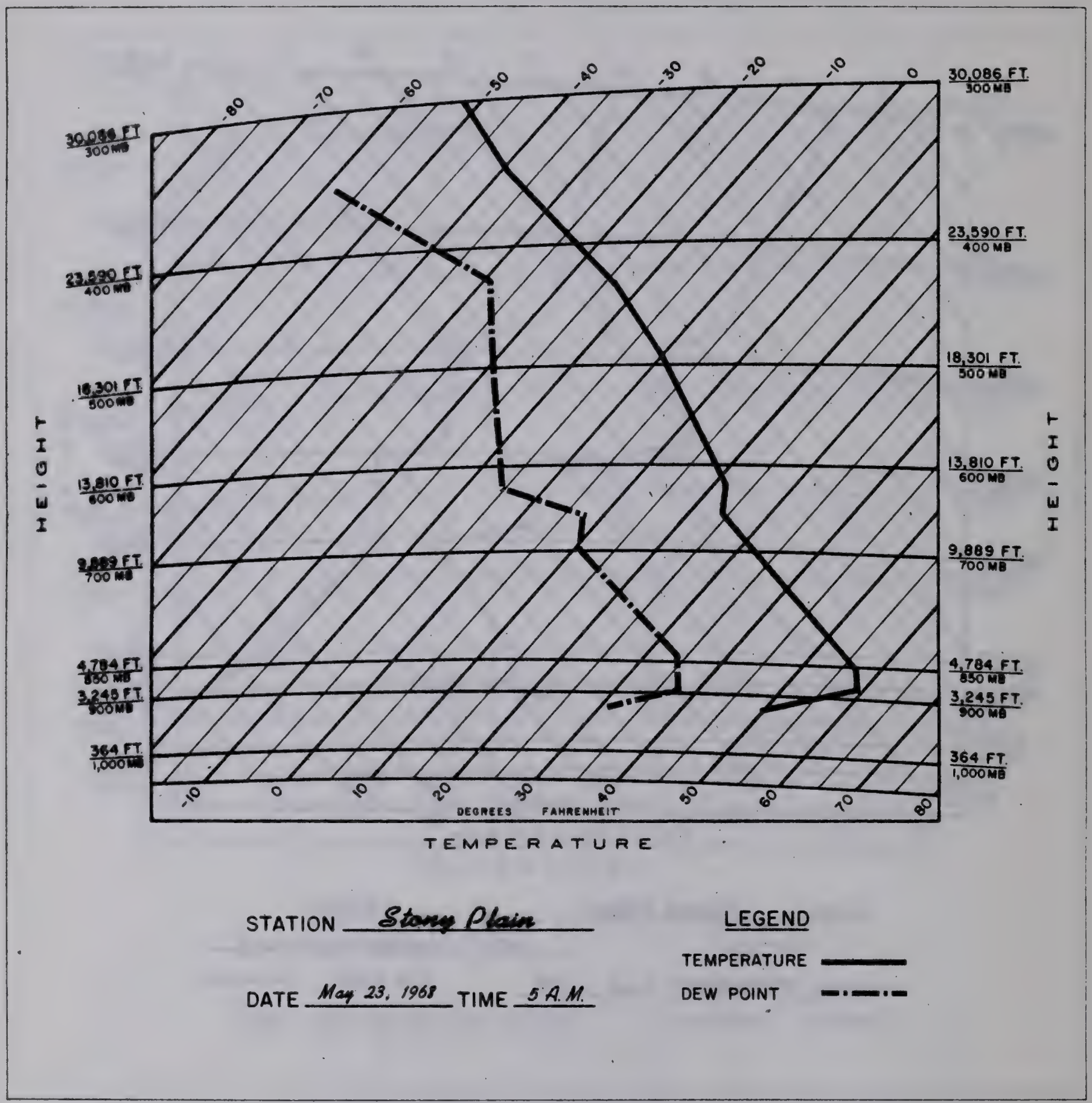
3,245 FT. 900 MB
364 FT. 1,000 MB
HEIGHT
-10
0
10
20
30
40
50
60
70
80
DEGREES FAHRENHEIT
TEMPERATURE
STATION Stony Plain
DATE May 22, 1968 TIME 5 P.M.
LEGEND
TEMPERATURE
DEW POINT



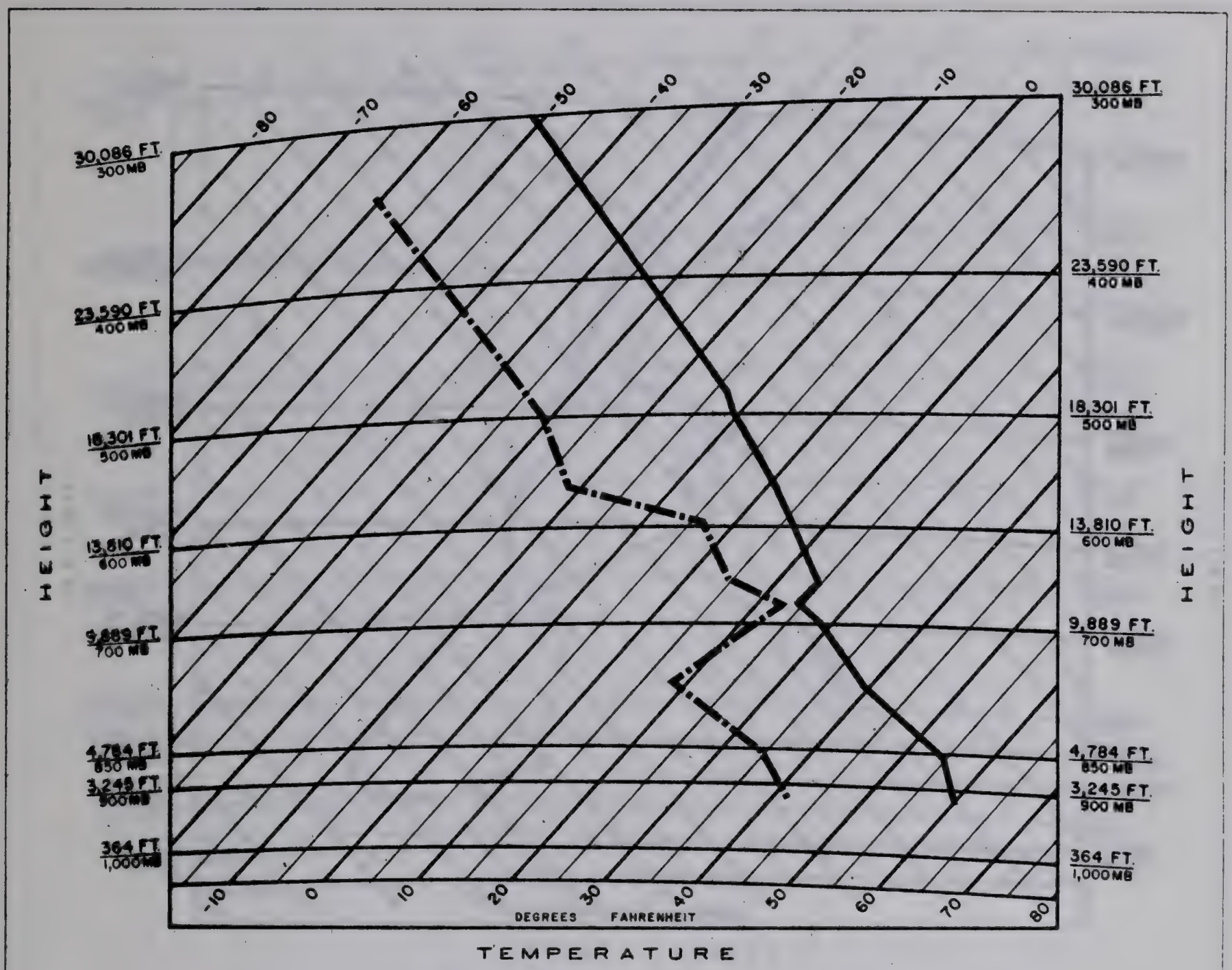
STATION *Stony Plain*

DATE *May 23, 1968* TIME *5 A.M.*

LEGEND

TEMPERATURE ——————

DEW POINT —·—·—



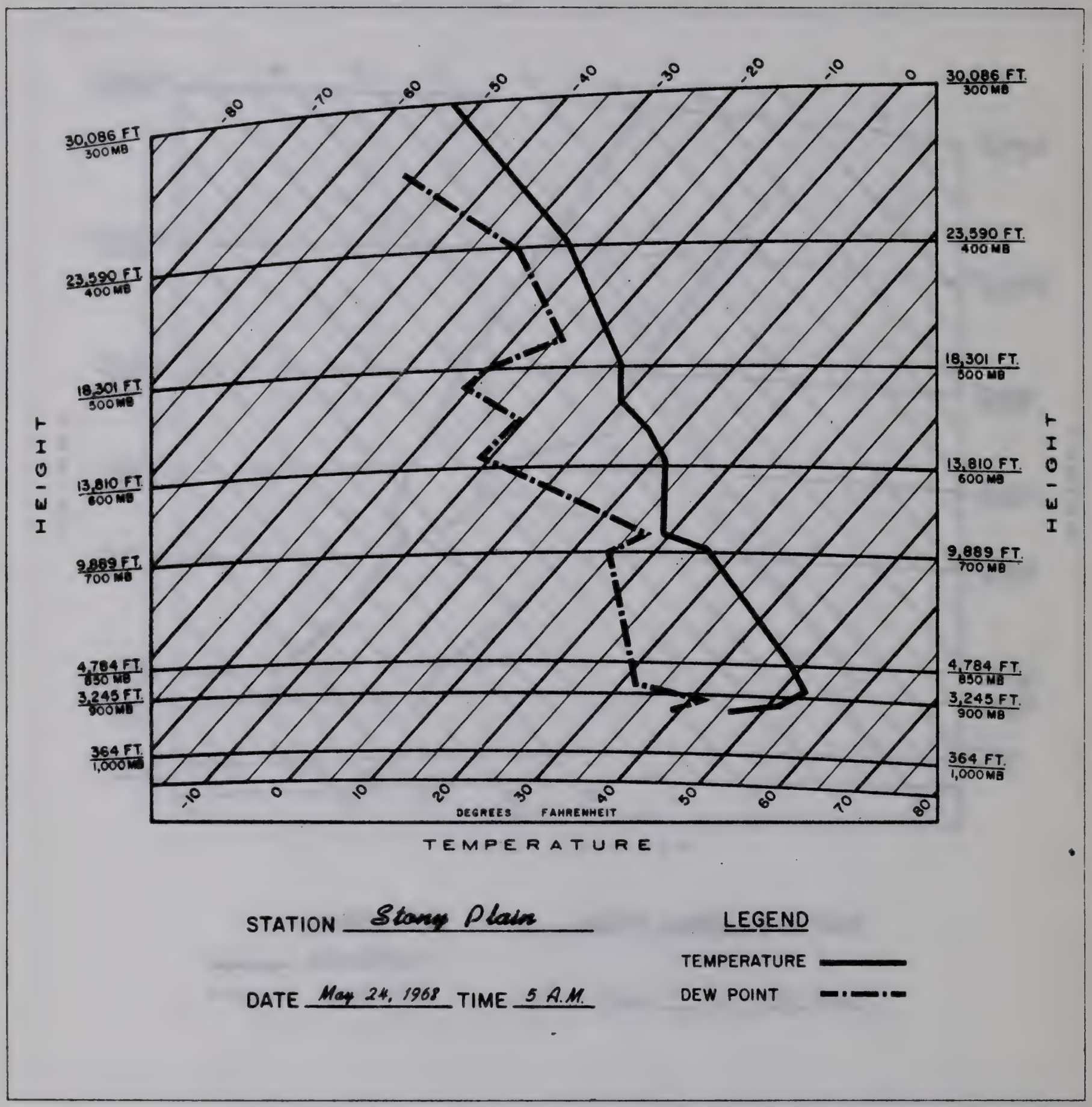
STATION Stony Plain

DATE May 23, 1968 TIME 5 P.M.

LEGEND

TEMPERATURE

DEW POINT



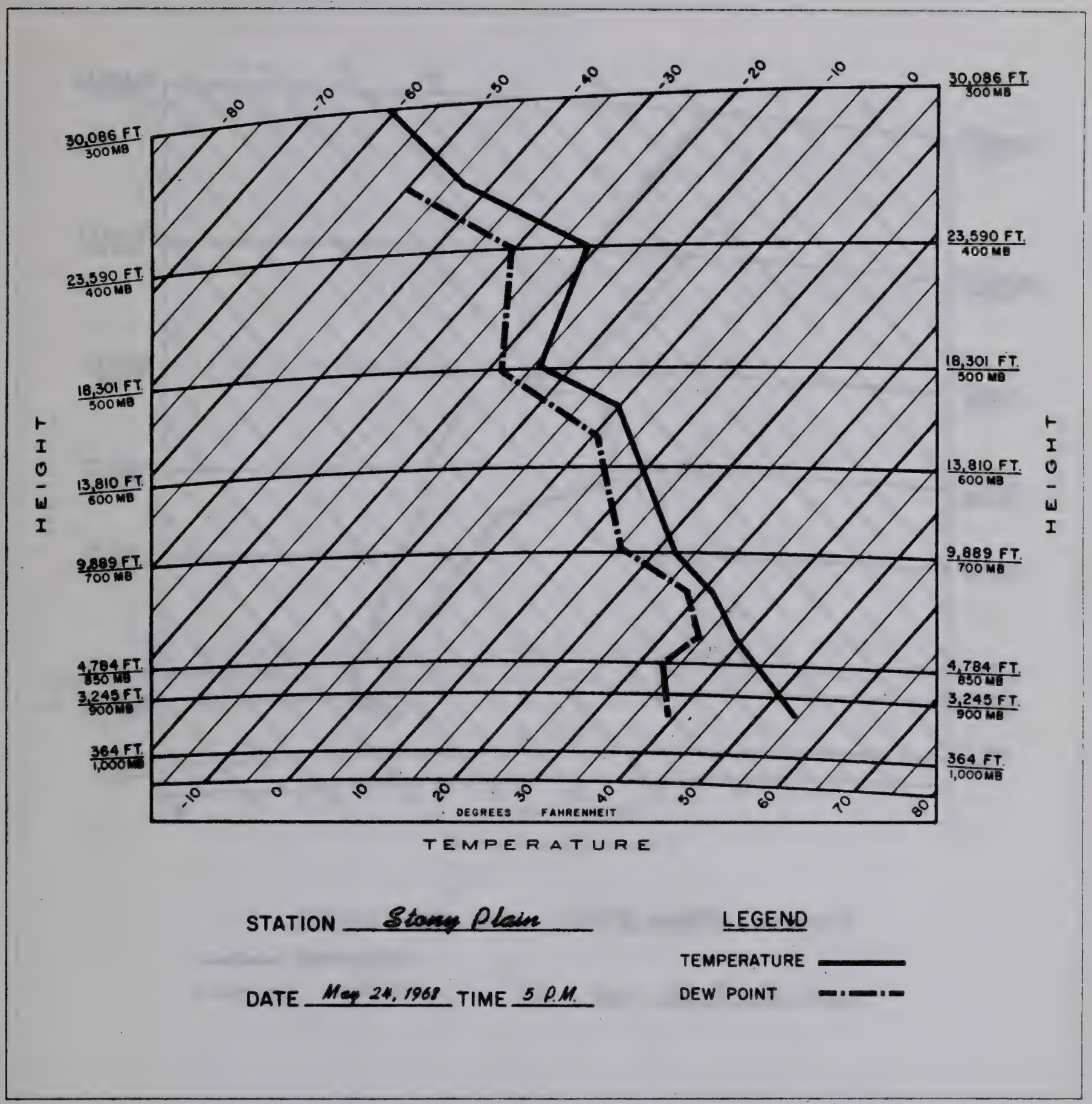
STATION *Stony Plain*

DATE *May 24, 1968* TIME *5 A.M.*

LEGEND

TEMPERATURE ——————

DEW POINT —·—·—



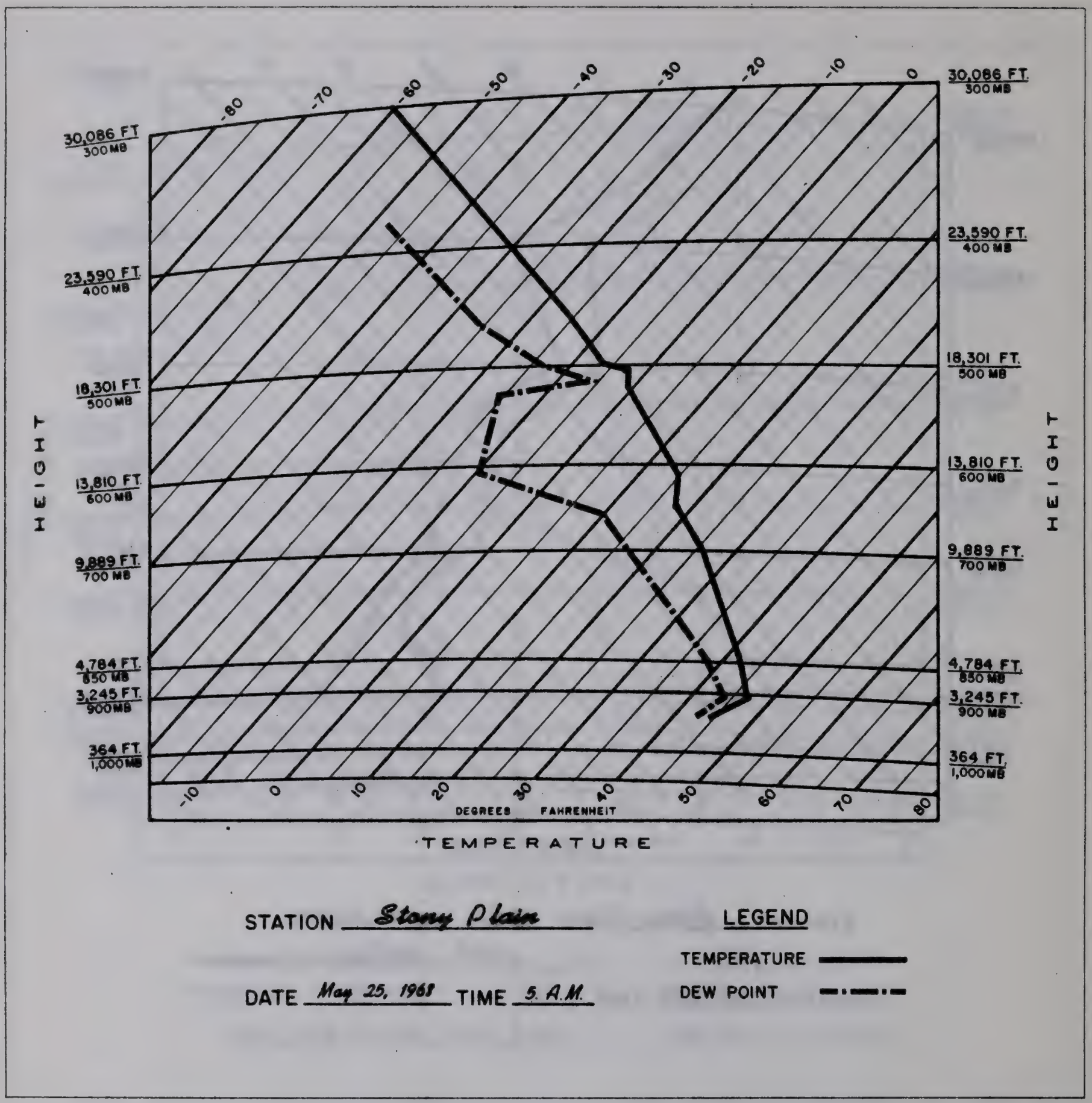
STATION Stony Plain

DATE May 24, 1968 TIME 5 P.M.

LEGEND

TEMPERATURE ——————

DEW POINT —·—·—



STATION Stony Plain

DATE May 25, 1968 TIME 5 A.M.

LEGEND

TEMPERATURE ——————

DEW POINT —·——·—

The following tables are the hourly surface weather reports as taken by the Department of Transport stations at Whitecourt, Wagner, and Lac La Biche.

HOURLY WEATHER REPORTS

MAY 18, 1968

LOCAL STAND. TIME	LAC LA BICHE D.O.T.					WHITECOURT D.O.T.					WAGNER D.O.T.				
	TEMP (°F)	WIND DIR. & SPEED	R.H	CLOUDS	REMARKS	TEMP (°F)	WIND DIR. & SPEED	R.H.	CLOUDS	REMARKS	TEMP (°F)	WIND DIR. & SPEED	R.H.	CLOUDS	REMARKS
May 17 2400	41	CALM	69			47	CALM	36			44	ESE 12	68		
May 18 0100	38	CALM	78			45	ENE 5	48			44	ESE 10	56		
0200	36	ENE 2	82			43	ENE 4	46			42	ESE 11	63		
0300	34	CALM	92			42	ENE 5	53			41	SE 8	71		
0400	31	CALM	94	AC 1		39	E 3	54			40	SE 10	70	Ci	
0500	30	CALM	97	AC 1		37	E 3	61			39	SE 10	76	Ci	
0600	34	CALM	75	AC 1		39	E 6	56			40	SE 12	75		
0700	43	SE 4	82	AC 1		42	E 11	55			43	ESE 15	72		
0800	47	E 6	76	AC 1		45	ENE 8	46	AC 1 Ci	K	46	E 14	64		
0900	52	SE 3	59	AC 1		51	ENE 7	38	AC 1 Ci	K	51	E 14	59		
1000	54	NE 7	52	CU 5		56	ENE 7	36	Ci	K	53	E 14	52		
1100	54	NE 8	53	CU 7		59	E 10	26	Ci	K	57	E 16	45		
NOON	56	E 10	50	CU 4		63	E 12	22	Ci	K	61	ENE 16	36		
1300	58	NE 7	48	CU 4		64	E 10	22		K	61	ENE 14	32		
1400	61	E 8	42	CU 4		65	E 10	22		K	63	ENE 12	30	CF 1	
1500	60	ENE 7	40	CU 3		66	E 12	21		K	62	ENE 14	33	CF 1 Ci 1	
1600	61	NNE 5	39	CU 3		66	ESE 10	20		K	64	ENE 12	31	CF 1 Ci 1	
1700	62	E 5	38	CU 3		67	E 6	19			63	ENE 12	31	Ci 1	
1800	62	NE 5	37	CU 1		66	E 8	19			63	E 10	31		
1900	61	CALM	39	CU 1	VSBY S 6 Mi. K	64	E 6	18			60	ESE 10	39		
2000	57	SSE 3	43	CU 1	K	61	E 10	21			55	ESE 12	41		
2100	52	CALM	48	AC 1	K	57	E 4	26			54	SE 6	41		
2200	46	S 2	58	AC 1	K	54	ESE 4	28			50	SE 6	46		
2300	45	SSE 3	59		K	48	ESE 4	37			47	SE 6	67		
	PRECIPITATION NIL					PRECIPITATION NIL					PRECIPITATION NIL				

HOURLY WEATHER REPORTS

MAY 19, 1968

LOCAL STAND. TIME	LAC LA BICHE D.O.T.					WHITECOURT D.O.T.					WAGNER D.O.T.				
	TEMP (°F)	WIND DIR. & SPEED	R.H	CLOUDS	REMARKS	TEMP (°F)	WIND DIR. & SPEED	R.H.	CLOUDS	REMARKS	TEMP (°F)	WIND DIR. & SPEED	R H.	CLOUDS	REMARKS
May 18 2400	41	S 4	66			46	SE 3	42			45	E 9	71		
May 19 0100	40	CALM	70			42	ESE 3	53			40	ESE 9	66		
0200	38	S 4	73			42	ESE 3	55			44	ESE 8	60		
0300	39	SE 6	74	AC 1		37	CALM	68			43	SE 8	64	Ci	
0400	38	SE 5	78	AC 1		36	E 3	67			43	ESE 9	56	Ci 1	
0500	35	SE 5	84	AC 1		32	CALM	78			42	ESE 8	63		
0600	42	SE 4	63			40	E 2	61			44	SE 14	58		
0700	49	S 9	47			45	E 6	52			46	ESE 18+	58		K
0800	52	S 8	43			49	E 6	47			50	E 12	58		K
0900	61	SE 9	27			55	ENE 8	41			55	E 12	52		
1000	62	SE 15	24			62	E 8 + 15	32			58	E 18+	45		
1100	64	S 15	23			66	SE 8	24			65	ESE 14	29		
NOON	65	SE 8	22		K	68	SE 10 + 20	20			68	ESE 14	22		
1300	66	S 12	20		K	70	ESE 10+18	16			69	SE 21+	21		
1400	68	S 10	20		K	70	ESE 8+16	16			70	SE 20+	21		
1500	68	SE 8	20	K 4		71	SE 9+18	16	K 3		72	SSE 14	19		K
1600	68	SE 14	20	K 6		72	SSE 15+20	14	K 5		73	SE 16+	17		K
1700	68	SE 12	18	K 8		72	SE 14	14	K 5		72	SE 20+	20		K
1800	68	SE 16	15	K 9		71	ESE 15+20	14	K 7		71	SE 14	19		K
1900	65	SE 8	20	K 8		68	ESE 10	17	K 7		70	SE 16	18	Ci 1	K
2000	61	SE 8	21	K 8		64	ESE 12	18	Ci 1	K 5	68	SE 12	21	Ci 2	K
2100	59	SE 8	24	K 6		64	ESE 15+20	18	Ci 1	K 5	62	SE 12	30	Ci 1	K
2200	54	SE 8	28	K 2		62	ESE 10	19	Ci	K 5	56	SSE 12	46	Ci 1	K
2300	54	SE 10	26	K 2		56	ESE 6	35	K 3		53	E 10	54	AC 1 Ci 1	K

PRECIPITATION NIL

PRECIPITATION NIL

PRECIPITATION NIL

HOURLY WEATHER REPORTS

MAY 20, 1968

LOCAL STAND. TIME	LAC LA BICHE D.O.T.					WHITECOURT D.O.T.					WAGNER D.O.T.				
	TEMP (°F)	WIND DIR. & SPEED	R.H	CLOUDS	REMARKS	TEMP (°F)	WIND DIR. & SPEED	R.H.	CLOUDS	REMARKS	TEMP (°F)	WIND DIR. & SPEED	R.H.	CLOUDS	REMARKS
May 19 2400	50	SE 6	33	K 2		54	NE 6	31	K 3		53	ESE 13	54	AC 1 Ci 1	K
May 20 0100	49	S 7	40			52	NE 6	31	K 3		52	E 10	53	AC 2 Ci 1	K
0200	48	S 6	39			52	E 8	33	K 2		53	ESE 10	44	Ci 1	K
0300	45	S 5	48	AC 1		48	E 6	39	Ci 3	K	48	ESE 16	56	AC 2 Ci 2	K
0400	41	SE 6	51	AC 1		47	E 6	39	Ci 2	K	49	SE 8	52	AC 2 Ci 1	
0500	41	SE 4	51	AC 1 Ci 1		45	E 6	40	Ci 2	K	49	SE 14	35	AC 2 Ci 2	
0600	48	SE 8	42	Ci 2		45	E 10	44	Ci 1	K	50	ESE 18+	38	AC 2 Ci 2	
0700	53	SE 12	40	Ci 2		49	E 10	40	Ci	K	52	E 14	42	Ci 2	
0800	56	SE 15+20	33	AC 2 Ci 2		54	E 9	32	Ci	K	57	ESE 24+	32	Ci 2	
0900	61	SE 15	29	Ci 2		59	ESE 12	25	Ci	K	60	ESE 26+	29	Ci 1	
1000	63	S 18+28	27	Ci 3		63	SE 10+18	21		K	63	SE 26+	24	Ci 2	
1100	65	S 12	24	Ci 3		65	SE 10+18	19		K	67	ESE 20+	25	Ci 2	
NOON	66	SE 20	23	Ci 1	K	69	SE 9+18	16	K 5		67	ESE 22+	20	Ci 1	
1300	67	S 15+ 25	21	K 2 Ci 2		70	SE 10+20	17	K 7		71	SSE 20+	19	K 1 Ci 1	
1400	68	S 15	21	K 3 Ci 1		71	ESE 9+18	17	K 7		70	SE 20+	22	K 9	
1500	69	SE 20+30	22	K 4 Ci		71	ESE 14+24	16	K 7		70	SE 26+	19	K 9	
1600	68	SE 20+30	22	K 4 Ci		72	SE 15+20	16	K 8		71	SE 20+	22	K 9	
1700	69	SE 18	22	K 4		70	SE 14+18	14	K 8		70	SE 22+	21	K 9	
1800	68	SE 15	18	K 7 Ci 1		69	SE 14+18	18	K 6		70	SE 16	22	K 8	
1900	66	SE 14	24	K 5 Ci 1		68	SE 14	21	K 6		69	SE 12	22	K 8	
2000	64	SE 10	25	K 2 Ci 1		66	E 10	23	K 6		66	SE 14	27	K 4 Ci 1	
2100	60	SE 6	29	K 2 Ci 1		63	E 10	24	K 6		60	SE 12	37	K 4 Ci 1	
2200	58	SE 6	31	K 1 Ci 1		59	E 10	30	K 6		59	SE 12	40	K 2 Ci 1	
2300	57	SE 8	36	K 1 Ci 1		57	E 6	30			54	ESE 8	44	AC 1 Ci 1	K

PRECIPITATION NIL

PRECIPITATION NIL

PRECIPITATION NIL

HOURLY WEATHER REPORTS

MAY 21, 1968

LOCAL STAND. TIME	LAC LA BICHE D.O.T.					WHITECOURT D.O.T.					WAGNER D.O.T.				
	TEMP (°F)	WIND DIR. & SPEED	R.H	CLOUDS	REMARKS	TEMP (°F)	WIND DIR. & SPEED	R.H.	CLOUDS	REMARKS	TEMP (°F)	WIND DIR. & SPEED	R H.	CLOUDS	REMARKS
May 20 2400	58	SE 15	33	K 1		54	E 5	35			50	ESE 12	51	K 3	
May 21 0100	55	SE 12	36			52	E 5	43			49	ESE 14	45	K 6	
0200	53	SE 12	37			51	E 4	42			46	E 14	56	K 2	
0300	50	SE 8	41			48	E 4	49			46	ESE 14	48	K 3	
0400	47	SE 8	43			46	E 2	51			46	ESE 14	49	K 4	
0500	46	SE 8	45			46	E 6	47			46	ESE 12	49	K 3 Ci	
0600	51	SE 10	38			47	E 10	48			47	ESE 14	55	K 1 Ci	
0700	55	SE 12	31			49	E 4	45			50	ESE 20+	56	K 2	
0800	59	SE 18	28			52	E 6	37			53	ESE 20+	51	K 2	
0900	64	SE 17	23			57	ENE 7	40	Ci 1		60	ESE 20+	39	K 2 Ci 1	
1000	68	S 15	20			61	E 7	34			64	E 18+	34	Ci	K
1100	70	S 15	19			68	ESE 7	24			70	ESE 14	26	Ci	K
NOON	72	E 20+30	17	Ci	K	70	E 10	23			73	SE 20	20	Ci	K
1300	73	SE 12	17	K 2		74	SE 14	21			74	ESE 8	20		K
1400	73	SE 20	16	K 3		75	SE 18	18			76	SE 14	22	K 2 Ci	K SW
1500	74	SE 20+30	14	K 4		75	E 12+18	18	K 4 CU 1		76	ESE 15	21	K 2 Ci	K SW
1600	75	SE 10	14	K 4		75	E 15+	18	K 5 CF 1		74	SE 12	19	K 2 Ci 2	K SW
1700	74	SE 14	16	K 4		74	E 12	19	K 5 CF 1		74	SE 16	19	K 8	
1800	73	SE 8	16	K 4		73	E 8	23	K 7 AC 2		73	SE 9	20	K 7 Ci	
1900	70	SE 8	18	K 4 Ci		72	SE 10+15	23	K 7 AC 3		70	SE 5	23	K 6 Ci 2	
2000	68	SE 9	21	K 2 Ci 2	K	69	WNW 15	29	K 4 AC 5	Wind Shift	62	SE 6	43	K 4 AC 3 Ci 2	K
2100	61	ESE 5	32	K 1 Ci 1	K	63	WNW 12	47	SC 6 AC3		62	SE 7	38	K 3 AC 2 Ci 1	
2200	58	ESE 7	34	K 1		60	WNW 10	52	SC 6 AC2		64	SE 11	29	K 6 AC 2	
2300	57	ESE 6	33	K 2		58	WSW 6	58	SC 2 AC		61	SE 11	34	K 1	
	PRECIPITATION NIL					PRECIPITATION NIL					PRECIPITATION NIL				

HOURLY WEATHER REPORTS

MAY 22, 1968

LOCAL STAND. TIME	LAC LA BICHE D.O.T.					WHITECOURT D.O.T.					WAGNER D.O.T.				
	TEMP (°F)	WIND DIR. & SPEED	R.H	CLOUDS	REMARKS	TEMP (°F)	WIND DIR. & SPEED	R.H.	CLOUDS	REMARKS	TEMP (°F)	WIND DIR. & SPEED	R H.	CLOUDS	REMARKS
May 21 2400	58	SE 8	30	K 2	K	57	NW 6	60	AC 3 Ci		59	S 12	35	K 9	
May 22 0100	55	ESE 7	35		K	54	W 4	61	AC 6 Ci		50	W 4	56	K 9	
0200	54	SE 7	35		K	54	W 6	61	AC 6		46	SW 6	72	K 9	
0300	51	SE 7	38		K	53	W 6	60	AC 6 Ci		43	WSW 3	80	K 10	
0400	52	SE 7	39		K	51	W 10	76	CU+4 AC2		43	SSW 4	85	K 9	
0500	50	SE 7	43	Ci	K	51	W 6	71	CU+5 AC2	VIRGA NE	43	SSW 6	87	K 9	
0600	53	SE 9	40	Ci	K	51	NW 8	76	AC 6 AC2		45	SW 6	85	K 8	
0700	58	SE 13	33	Ci	K	51	NW 6	73	CU 7 AC2	CU+ EMBEDDED	52	SE 1	76	K 7	
0800	61	SSE 12	29	Ci	K	53	W 5	70	CU 7 AC1	CU + 7 EMBEDDED	54	NE 5	71	K 4	
0900	66	ESE 8	28	Ci	K	58	WNW 2	61	K 4 CU 1		55	N 4	71	K 4 AC 3	
1000	68	ESE 16	28	Ci	K	63	E 2	46	K 6 Ci 1		55	NW 4	71	K 3 AC 3	
1100	72	ESE 14	23	Ci	K	65	NNE 8	43	K 7 Ci 1		56	NW 6	67	K 6 AC 1	
NOON	73	ESE 18	15	K 1 Ci	K	71	E 12	31	K 9		60	NNW 6	60	K 8	
1300	74	ESE 18	11	K 3 Ci	K	74	E 14	26	CU + 7	K	58	NW 5	59	K 7 CU 1	
1400	74	ESE 18	12	K 7 Ci 1		75	E 12+18	23	CU + 7		62	NW 8	57	K 4 CU+4	
1500	75	ESE 18+26	11	K 7 Ci 1		75	ESE 12+20	18	CU + 6		64	WNW 6	48	K 4 CU+3	
1600	74	ESE 18	13	K 7 Ci 1		76	ESE 12+20	15	CU+5	K	64	NW 3	45	K 5 CU+3	
1700	74	ESE 15	14	K 7 Ci 1		76	E 10 + 18	14	CU + 4	K	67	ESE 6	35	K 6 AC 2	
1800	73	ESE 9	17	K 7 Ci 1		74	E 10 + 18	16	CU+2 Cil	K	69	SE 4	37	K 9	
1900	70	ESE 12	21	K 7 Ci		73	E 8 + 16	17	SCl ACl	Ci K	65	E 4	44	K 8 AC 2	
2000	65	ESE 12	26	K 7 Ci		67	W 10	34	AC 4 Ci	Wind Shif	57	W 2	63	K 7 AC 3	
2100	61	ESE 3	31	K 7 Ci		57	W 10	55	AC 7 Ci		61	SE 10	39	K 9	
2200	56	CALM	37	K 6 Ci		51	WNW 12	64	AC 5 Ci		63	SE 10	33	K 9	
2300	54	SE 2	42	Ci 2		50	W 12	65	AC 3 Ci	K	55	SW 10	60	K 10	

PRECIPITATION NIL

PRECIPITATION NIL

PRECIPITATION NIL

HOURLY WEATHER REPORTS

MAY 23, 1968

LOCAL STAND. TIME	LAC LA BICHE D.O.T.					WHITECOURT D.O.T.					WAGNER D.O.T.				
	TEMP. (°F)	WIND DIR. & SPEED	R.H	CLOUDS	REMARKS	TEMP. (°F)	WIND DIR. & SPEED	R.H.	CLOUDS	REMARKS	TEMP. (°F)	WIND DIR. & SPEED	R H.	CLOUDS	REMARKS
May 22 2400	53	SE 2	44	Ci 2		46	W 8	74		K	52	SW 8	66	K 2	
May 23 0100	50	SE 2	48	K 3 Ci		44	W 6	73		K	49	W 8	68	K 4	
0200	48	SSE 3	49			41	NW 12	77			47	SW 6	70	K 7	
0300	47	SE 3	52			39	W 12	83			39	SW 4	86	K 8	
0400	45	SE 2	59	K 4		38	NW 10	83			37	SW 6	90	K 8	
0500	44	SE 4	62	K 4		38	W 6	83		K	38	SW 4	88	K 4 Ci 1	
0600	51	SE 4	50	K 4		39	W 10	83	SF 3	K	39	SW 4	86	K 3 Ci 2	
0700	59	SE 7	37	K 2		42	W 6	69		K	46	NW 8	78	K 4 Ci 1	
0800	62	ESE 10	35			43	WNW 5	72	Ci 2	K	46	N 6	80	K 4 Ci 1	
0900	68	SE 13	28			48	CALM	62			47	N 4	74	K 3 Ci	
1000	72	SSE 15	24	CU 1	K	55	CALM	51			48	SW 8	80	K 4 CU 1	
1100	72	SSE 18+25	23	CU 3	K CU + Associated	64	SE 13+18	35	CU 1		49	NW 6	75	K 4 CU 3	
NOON	73	S 20+25	21	CU 3	CU + Associated	68	SE 12	29	CU + 7		51	N 4	64	K 2 CU 4	
1300	74	SE 18+25	23	K 1 CU7	CU + Associated	69	ESE 15+26	27	CU + 9		69	SE 12	33	K 8 CU 1	
1400	71	SE 18+25	23	CU + 8		68	SE 12+18	25	CU+8		67	SSE 14	32	K 8 CU+1	
1500	74	S 15	22	K 1 AC8		68	SE 18+30	28	CU + 8	K	68	SE 10	31	K 8 CB 2	
1600	74	SE 18+26	22	K 1 AC4		69	SE 24+38	29	CU + 6	K	68	SE 20+	26	K 10	
1700	72	SE 15	24	K 1 AC4		68	SE 16+28	33	CU + 6	K	67	SE 12	28	K 10	
1800	71	SE 13	23	K 2 AC4		67	SE 12+24	32	Ci CU + 6	K	68	SE 7	25	K 10	
1900	72	SE 12+20	22	K 3 AC4		66	SSE 12+22	31	CU+3 CB 1 Ci	K	67	ESE 12	31	K 10	
2000	68	SE 12	21	K3 CU3		64	ESE 10	39	SC 1 AC1 Cil	K	69	S 12	26	K 9	
2100	66	SE 8	26	K 2 CU 2 Ci 2		61	ESE 5	42	SC 1 AC 2 Ci	K	68	SSE 18+	31	K 8 AC 1	
2200	62	SE 7	30	K 2 CU 2 Ci 2		59	SSE 5	43	SC 3 AC 1 Ci	K	66	SE 10	34	K 8 AC 1	
2300	62	SE 9	30	K 2 CU 1 Ci 3		58	CALM	44	SC3 AC5	K		STATION EVACUATED			

PRECIPITATION NIL

PRECIPITATION NIL

PRECIPITATION NIL

HOURLY WEATHER REPORTS

MAY 24, 1968

LOCAL STAND. TIME	LAC LA BICHE D.O.T.					WHITECOURT D.O.T.					WAGNER D.O.T.				
	TEMP. (°F)	WIND DIR. & SPEED	R.H.	CLOUDS	REMARKS	TEMP. (°F)	WIND DIR. & SPEED	R.H.	CLOUDS	REMARKS	TEMP. (°F)	WIND DIR. & SPEED	R.H.	CLOUDS	REMARKS
May 23 2400	58	SE 7	39			51	CALM	64	AC 3			STATION EVACUATED			
May 24 0100	57	SE 8	37			50	CALM	58	AC 1			STATION EVACUATED			
0200	54	SE 8	38			43	CALM	72	AC			STATION EVACUATED			
0300	52	SE 5	39	Ci 1		39	CALM	83	AC 1 Ci			STATION EVACUATED			
0400	51	SE 8	42	AC 1 Ci		36	W 3	90	Ci 1			STATION EVACUATED			
0500	49	SE 6	47	AC 1 Ci		36	CALM	92	Ci 1			STATION EVACUATED			
0600	54	SSE 12	45	Ci 1		41	CALM	77	Ci 1			STATION EVACUATED			
0700	59	S 16	46	Ci 1		47	CALM	67	Ci 1			STATION EVACUATED			
0800	63	S 18+24	44	AC 1 Cil		52	CALM	53	Ci 1			STATION EVACUATED			
0900	68	SSW 18+26	36	AC 4 Cil		57	WNW 5	45	Ci 2			STATION EVACUATED			
1000	67	S 22+30	35	CU+2 AC 5 Cil		61	NW 4	37	CU2 Ci2			STATION EVACUATED			
1100	68	SSW 20+27	33	CU+2 AC5 Cil		64	E 2	32	CU4 Cil		61	ENE 6	48	CU 2 Ci3	K
NOON	67	SW 15+22	32	CU+7 ACl Ci		65	CALM	32	CU7 Cil		61	N 4	42	CU 3 Ci 2	K
1300	66	SSW 22+30	36	K 1 CU+7 Ci		67	SE 8	28	CU7 Cil		60	NW 8	53	CU+6 Ci 2	K
1400	67	SSW 15+22	35	K 1 CU+6 AC Ci		68	ESE 7	25	CU8 Cil		61	NW 8	46	CU+7 Ci 2	K
1500	66	SW 12	34	Kl CU+2 AC 7		69	SSE 7	25	CU7 Cil	CU+ Associated	63	NNW 5	42	K 4 CU+5	
1600	68	W 7	32	K 1 CU 1 AC4 Cil		68	E 12	22	CU+6 Ci 1		63	NW 7	38	K 3 CU+6	K
1700	68	SSE 9	31	K 1 CU 2 Ci 5		66	ESE 12	34	CU+3 AC3 Cil		62	NE 6	47	K 9 CU+1	
1800	67	CALM	37	K 1 CU 5 Ci 2		62	ESE 10	42	CU+3 AC2 Ci		64	SE 14	39	K 10	
1900	64	CALM	43	K 1 CU 5 Ci 2		61	ESE 8	48	CU+1 AC3 Ci			STATION EVACUATED			
2000	61	CALM	49	K 1 CU 4 Ci 1		59	SE 4	50	SC 1 AS6 Ci7			STATION EVACUATED			
2100	60	CALM	45	K 1 CU+6 Cil		53	CALM	57	SC 2 AC6 Cil			STATION EVACUATED			
2200	50	CALM	68	CU+6 Ci2 K		54	E 5	63	SC 2 AC6 Ci			STATION EVACUATED			
2300	49	ENE 3	73	CU+6 Ci2 K		52	CALM	59	SC 1 AC5 Ci			STATION EVACUATED			

PRECIPITATION NIL

PRECIPITATION NIL

PRECIPITATION NIL

H
1020
L
1028
H
L
L
L
H
1020
H
1028
1032
1036
H
5 M.P.H.
5 M.P.H.
10 M.P.H.
T 55° F
RH 30%
15 M.P.H.
T 70° F
RH 15%
15 M.P.H.
1008